FISHERY MARKET NEWS

FEBRUARY 1942

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FISHERY MARKET NEWS

A REVIEW OF CONDITIONS AND TRENDS OF THE COMMERCIAL FISHERIES

February 1942 | Washington, D. C. | Vol. 4, No. 2

SUMMARY

Special Articles

The Pacific Coast Shark Fishery.--Wartime needs for vitamin A oils have proved a boon to west coast fishermen. Once negligible, commercially, the shark fishery now assumes major importance as source of raw material for this world-wanted product. Only since 1936-37 have livers of sharks--especially those of the soupfin shark--and dogfish, been focus of an industry: total liver production leaped from 108,600 pounds then, to over four million pounds last year; and price of 20 cents per pound in 1939 on soupfin livers, for example, skyrocketed to as much as $9 per pound in 1941.

Pasteurization of Crab Meat--II.--A crab meat plant needs no additional equipment for pasteurization except a double seamer and a supply of C-enamel lined cans--No. 2 for 1-pound net weight of contents; No. 2 flat for 1/2-pound--and an accurate Fahrenheit thermometer. One-half pound cans should be processed 70 minutes, and 1-pound, 103 minutes, in water at 170° F. Present cans with bottom holes or friction tops are unsuitable; water may enter and contaminate the meat.

Canning of Alewives (River Herring), Sea Herring, Mackerel, and Fish Flakes.--Questions on packing of lesser known species of fish, as well as those canned infrequently or in small quantities, are answered in full in this excerpt from a longer manuscript. Emergency needs are again pushing practical research to find ways to bolster present supplies of fishery foodstuffs.

Fresh Fish

During the week ending January 31, the comprehensive index of nearly 900 wholesale price series rose 0.4 percent, to 95.9 percent of the 1926 average, the highest level since September 1929.

Three-port landings (Portland, Me., Boston and Gloucester, Mass.) totaled 473.5 million pounds worth 15.3 million dollars for 1941--both new high records.

Maine's legislative committee is considering an all year 'round sardine packing season for an industry pressed by export and home-market demands. Vinalhaven has a newly formed credit union; and cooperative activity is on the increase among Maine's fishermen.

On the Great Lakes, women are filtering into the fishing industry in several capacities; numbers of smelt have increased 200 percent; and lamprey eels are on the increase.

Chicago's total receipts for 1941 went 10 percent above 1940.

Frozen Fish

Holdings in domestic cold-storage plants of only 97,000,000 pounds on January 15 indicate a decrease of 17 percent from December. Freezings of all principal items were also down, compared with the previous month, but generally above same period a year ago and 5-year average. Salmon, halibut, and shrimp were held in largest quantities.

Canned Fish

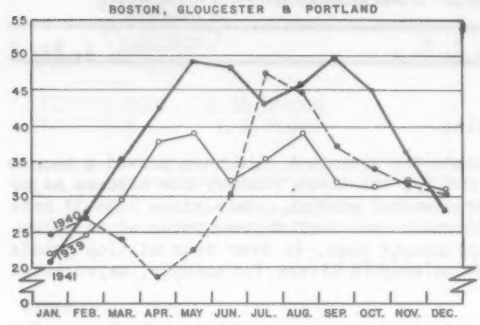
Canners' unsold stocks of salmon--less than 300,000 cases on hand, January 31--show a continued down-trend. Distributors' stocks were up one-tenth on January 1, from a year ago, mainly in stocks of pinks. Most salmon quotations are being withdrawn.

The shrimp pack is 24 percent below the 5-year average; and the 1941 packs of both tuna and mackerel are sharply down--33 and 40 percent, respectively--as compared with 1940.

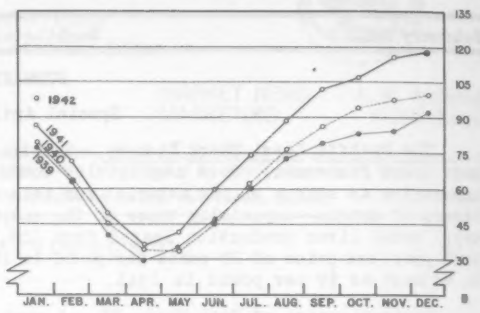
TRENDS OF FISHERY TRADE

In millions of pounds

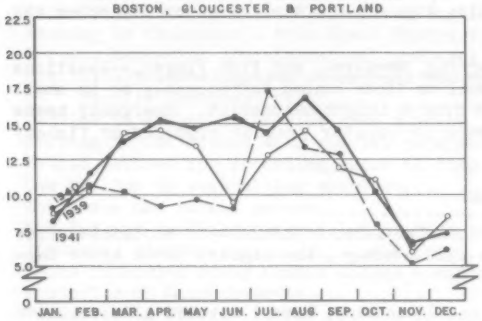
VESSEL LANDINGS, ALL FRESH FISH
BOSTON, GLOUCESTER & PORTLAND



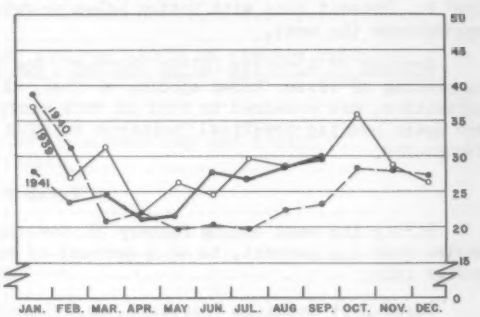
DOMESTIC COLD-STORAGE HOLDINGS OF FROZEN FISH



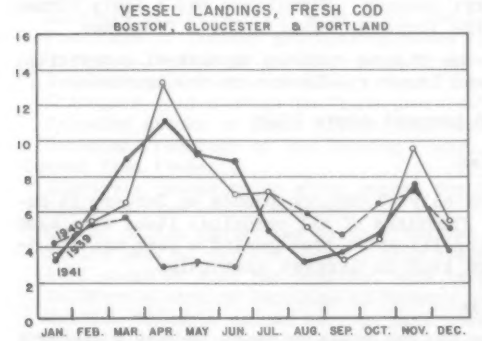
VESSEL LANDINGS, FRESH HADDOCK
BOSTON, GLOUCESTER & PORTLAND



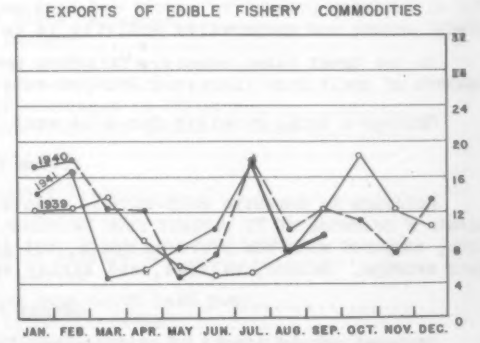
IMPORTS OF EDIBLE FISHERY COMMODITIES



VESSEL LANDINGS, FRESH COD
BOSTON, GLOUCESTER & PORTLAND



EXPORTS OF EDIBLE FISHERY COMMODITIES



THE PACIFIC COAST SHARK FISHERY

By

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V. J. Samson, Assistant Fishery Marketing Specialist
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U. S. Fish and Wildlife Service

The economic status of Pacific Coast sharks has changed radically within the past five years. Formerly believed to be of little commercial value, sharks now are eagerly sought in increasing number by fishermen from Alaska to Mexico and occupy a prominent position with respect to other major fisheries. The prices paid for sharks compare favorably with those paid for many food fish and, in the case of the soupfin shark, its value far exceeds that of any other fish taken from the ocean commercially.

The cause for this development is the extremely high vitamin A content of shark livers, and the fact world conditions have made the United States increasingly dependent upon sharks as a source of raw material for vitamin oil manufacture.

Development of the Shark Fishery.--Sharks have been taken incidentally in established Pacific Coast fisheries since their inception, the carcass being brought ashore for limited distribution as a food fish or for reduction purposes. In many instances they were discarded at sea when caught. In California, fresh shark fillets and steaks were marketed in some quantity and shark fins were dried for sale as soup stock, primarily for consumption by the oriental population. In the Pacific Northwest, dogfish were taken in limited quantity for manufacture into fertilizer and oil. The liver oil, if rendered separately, was considered a technical oil product. Also, during the last world war, an unsuccessful attempt was made to can dogfish and some other sharks in an effort to supplement the supply of preserved protein foods. Until the vitamin development, however, no fishery of any consequence had ever been established.

Shark livers were first utilized commercially as a source of vitamins in the United States between 1936 and 1937. During that time, several California sardine manufacturers became interested in finding a source of vitamin A which could be used at relatively low cost to fortify biologically-tested sardine oils then being offered in the animal feeding oil market. Dogfish livers were among the first livers used, giving the initial stimulus for activity in the Pacific Northwest.

During November 1937, Seattle buyers, representing the California interests, began offering 5 cents per pound for Puget Sound livers. These were packed in 5-gallon friction-top tin cans, frozen, and later shipped to California for extraction. Between November 1937 and April 1938, a total of 226,605 pounds of dogfish livers were handled by the Seattle buyers at an average price of 5½ cents per pound. In April 1938, the offer was withdrawn, and the fishery remained relatively dormant until the spring of 1940.

Offerings for dogfish livers were withdrawn because California producers had discovered that the liver of the soupfin shark was practically as fat as that of the dogfish, the vitamin potency of the oil was much higher, and soupfin sharks could be taken in sufficient quantity to meet their then relatively moderate demands. The catch of sharks in California during 1938 amounted to 7,972,310 pounds, including 3,465,820 pounds of soupfin sharks.

By 1939 the soupfin shark fishery had become an industry of some importance in California. The catch of soupfin sharks amounted to 4,730,350 pounds, and the total for all sharks was 9,775,220 pounds. The soupfin shark fishery was centered largely around Monterey and San Francisco where fishermen received from $40 to $60 per ton for the catch. During 1939 soupfin shark livers from incidental catches of the halibut fishery off the Washington Coast were also brought in, when an offer of 20 cents per pound encouraged saving these livers. Washington liver landings for the year, however, amounted to only 6,884 pounds.

During 1940 interest in soupfin sharks continued to increase along the entire coast, and offerings were again renewed for dogfish livers. This may be attributed to a number of factors:

1. The outbreak of war in Europe during 1939 and the invasion of Norway in the spring of 1940 cut off the normally large imports of cod liver oil, thus increasing the demand for vitamin oils of domestic origin.

2. An economical process was developed for concentrating vitamin A from oils of relatively low vitamin potency, such as dogfish liver oils.

3. The relatively low price at which shark and dogfish liver oil vitamin A could be prepared made this source increasingly competitive with the established vitamin liver oils and created a greater incentive for fortifying foodstuffs.

4. Recognition of the potentially greater market for shark and dogfish liver oils caused new oil producers to enter the field in all three coastal states, thus increasing the competition for raw materials.

Shark landings in California for the year amounted to 10,035,680 pounds, of which there were 5,059,800 pounds of round soupfin sharks. In Oregon and Washington, the landings of soupfin shark livers and dogfish livers totaled 40,500 pounds and 508,284 pounds, respectively. California prices ranged from $60 to $200 per ton for the whole shark, while Washington and Oregon prices ranged from 30 cents to $1.00 per pound for soupfin shark livers and 5 to 6-1/3 cents per pound for dogfish livers.

The year 1941 will long be remembered in the annals of the Pacific shark fishery. After following a pattern during the first six months somewhat similar to that for the preceding years, offerings for the catch began to spiral. Within a short period the price of whole sharks in California skyrocketed from several hundred dollars per ton, to $800 to $1,000 per ton, then up to $1,500 per ton. A few catches were taken at approximately $2,000 per ton.

In the same period, in Oregon and Washington, the price for soupfin shark livers rose from around a dollar per pound to $6 to $9 per pound, and that for dogfish livers from 8 to 10 cents per pound to over 50 cents per pound. This unprecedented price rise attracted into the fishery practically every type of fishing craft available, and the returns to the fishermen were almost beyond imagination, many men sharing as much as $1,000 per trip of frequently not more than a week.

In the face of unsettled conditions and pending price ceilings, in early November, the resultant increase in the price for vitamin A necessitated by these high liver prices caused a reaction in the vitamin market. This led to curtailment of buying, and liver buyers were in turn forced to lower their offers for shark and dogfish livers. During December 1941, and in January 1942, fishing was limited by weather and war. Prices have been about $1,000 per ton for round male soupfin sharks, $200 per ton for round females (in California only), $5 to $6 per pound for soupfin shark livers, and about 30 to 35 cents per pound for dogfish livers.

The effect of increased liver prices was most noticeable in Oregon and Washington, where a total of 176,460 pounds of soupfin shark livers and 2,876,144 pounds of dogfish livers were taken during 1941. The value of these livers was over $1,500,000 to the fishermen. The 1941 catch of soupfin sharks in California has been estimated to be about the same as for 1940. The estimated value of the total shark fishery, due to increased landings of other sharks and the much higher prices paid for all species, is about $3,000,000.

The spiralling of shark liver prices during the late summer and fall of 1941 was brought about by competition in liver buying based on the following developments in the vitamin market:

1. Continued increase in domestic consumption of vitamin A.

2. Shutting off imports of Japanese livers, thus forcing oil producers from all sections of the United States to participate more actively in the Pacific Coast liver market.

3. Government buying of large lots of vitamin A for export to friendly nations under the Lend-Lease Act.

4. Willingness of buyers of vitamin A to continue purchasing at the increasingly elevated vitamin A prices necessitated by the higher offers being made for livers.

Pacific Coast Shark Liver Production, 1937-1941

Item	1937 Pounds	1938 Pounds	1939 Pounds	1940 Pounds	1941 Pounds
California:					
Grayfish (Dogfish).....	12,800	109,495	150,762	111,458	125,000*
Soupfin sharks.....	40,000	346,582	473,035	505,980	550,000*
Unclassified.....	38,620	341,154	353,725	386,130	375,000*
Total.....	91,420	797,231	977,522	1,003,568	1,050,000*
Oregon:					
Grayfish (Dogfish).....	-	-	-	188,437	521,365
Soupfin sharks.....	-	-	-	28,704	92,364
Total.....	-	-	-	217,141	613,729
Washington:					
Grayfish (Dogfish).....	17,255	209,350	-	319,847	2,354,779
Soupfin sharks.....	-	-	6,884	11,796	84,096
Total.....	17,255	209,350	6,884	331,643	2,438,875
Pacific Coast:					
Grayfish (Dogfish).....	30,055	318,845	150,762	619,742	3,001,144
Soupfin sharks.....	40,000	346,582	479,919	546,480	726,460
Unclassified.....	38,620	341,154	353,725	386,130	375,000
Grand Total.....	108,675	1,006,581	984,406	1,552,352	4,102,604

*Estimated on basis of reports.

Species of Sharks Taken.--The preceding discussion has referred only to the soupfin shark (Galeorhinus zyopterus) and the common dogfish or grayfish (Squalus suckleyi). Other species are being taken also. Some of these are equal to or better than dogfish as sources of vitamin A, and at least one approaches the vitamin content of the soupfin sharks taken off the southern California Coast. This is the hammerhead shark (Sphyrna zygaena). The hammerhead shark, however, is not as rich in vitamin A as the soupfin sharks taken from central California and north.

Species of sharks which compare favorably in vitamin content with the better dogfish are the gray smooth-hound shark (Mustelus californicus), the brown smooth-hound shark (Rhinotriacis henlei), the bay shark (Carcharias lamiella), and the great blue shark (Prionace glauca). Livers of poorer vitamin content are also taken from such species as the leopard shark (Triakis semifasciata), the thresher shark (Alopias vulpes), the bonito shark (Isurus glaucus), and other so-called "junk" species of sharks as well as from ratfish (Hydrolagus collici) and miscellaneous skates.

An excellent condensed description of the sharks found off the Pacific Coast of the United States is given in Fish Bulletin No. 45 of the California Division of Fish and Game, The Sharks and Rays of California by Lionel A. Walford.

Seasonal Variation in Catches.--In the Pacific Northwest it is difficult to determine accurately the seasonal abundance of the soupfin shark, as intensive fishing for this species has been attempted only since September 1941. However, since the fishery began in 1939, most of the soupfin sharks caught off Washington and Oregon Coasts have been taken by halibut craft between September and March, the closed season in the halibut fishery. A seasonal peak has been noted in October and November, with catches rapidly dropping off to a low in March. If the halibut fleet is to continue as an important unit in soupfin shark liver production, it appears that most of the catches in the Northwest will be made during the fall and winter months. This period is also the closed season in the salmon fishery, and trollers and gill-net boats may be free to enter the fishery.

In northern California from Crescent City to San Francisco, the greater catches of soupfin sharks also are made in the winter months. It is interesting to note that about 20 large halibut vessels from Seattle participate in the northern California winter fishery and contribute materially to the landings at Eureka and San Francisco.

In central California, off Monterey, most of the shark landings are made during the late summer and early fall months, while the season of greatest productivity in southern California extends from February to August.

In California approximately 65 percent of the soupfin sharks taken are landed in the San Francisco Bay area, with about 25 percent in Monterey and Santa Barbara, and most of the remainder in Eureka and Crescent City.

Fishing Methods.--Prior to 1939 most of the sharks and dogfish taken in California were caught by small market fishing boats, using hand and set lines, and drag boats employing otter trawls and paranzella nets. Most of the sharks taken in the area between San Francisco Bay and Monterey were caught by set line gear.

Early in 1939 six Seattle halibut vessels entered the shark fishery off central California, when an offer of $40 per ton for soupfin sharks encouraged larger craft to enter the fishery. These vessels employed regular halibut gear, and carried a crew of 4 to 6 men, using from 12 to 14 skates of gear, or nearly 2,000 hooks with all of the gear set.

This method of fishing for sharks differs from halibut fishing principally in the use of a wooden tub to carry each skate of gear, instead of the normal practice of tying each skate in a separate bundle. The wooden tubs have several advantages. Since the hooks are placed on the rim of the tub, they are easily baited. This also avoids contact with the rest of the gear. It is understood that 4 men can handle as much set line gear in tubs as 6 to 8 men handle halibut gear in the regular manner.

In fishing set line gear for sharks, fresh bait is used if available. Sardines and herring are preferred. A whole fish is used on each hook when bait is plentiful. The hooks are baited enroute to the fishing banks, which are usually within the 100-fathom line, and fairly close to shore. In setting the gear it is the normal practice to run out to the 100-fathom line and start setting a string of gear toward shore at right angles to the shore line. The baited hooks are 13 feet apart, and from 3 to 4 skates of gear are tied together to form a line about 900 fathoms long. Usually 3 strings of gear are set in this manner, parallel to each other, and about 300 fathoms apart. The baited lines are allowed to set about 3 hours and are then taken up by means of a power gurdy over rollers on the starboard side.

A new development with halibut vessels in shark fishing is the use of drift and anchor gill-nets. These nets are made of cotton twine, of about 10-inch stretched mesh, 50 fathoms long, and about 20 feet deep. The nets, about 12 to a boat, are fished at night fairly close to shore in less than 20 fathoms of water and have been reported very successful in operations out of Eureka and San Francisco. It is understood that one boat made an $18,000 catch of soupfin sharks in less than 4 days of fishing, most of which was taken in gill-nets from one set.

The use of gill-nets for soupfin sharks has been tried off the Columbia River with a fair degree of success, and it appears likely that the use of this type of fishing gear will be greatly expanded during 1942.

Handling Methods.--The fishery laws of the State of California require that the entire carcass be saved. It is general practice to remove the livers from the fish immediately after catching and to place them in 5-gallon tin containers. The tins of livers are packed in ice aboard the vessel while the carcass may or may not be, depending on the length of the trip. Carcasses reaching port in good condition are sold in the fresh fish market for preparing fillets and steaks. The poorer quality and surplus fish are generally used for reduction.

The practice of landing carcasses and livers separately has been the subject of some discussion in the industry because of its possible effect on the marketing of shark livers. In certain localities there is a rather wide differential between the prices being offered for male and female soupfin shark livers. Some claim that once they are removed, it is difficult to differentiate between the livers of the two sexes without subsequent vitamin assay. Trading is, therefore, confused. Others hold that landing the fish in the round would give those in a position to handle shark carcasses control over the trading in shark livers. The opinion is given, also, that the extremely fat livers will contaminate the body flesh with oil if left in the carcass until the catch is landed.

In Oregon and Washington, shark and dogfish have not as yet gained the status of food fish, so the method of handling is not subject to regulation. Consequently, it has been general practice to remove the liver and throw the carcass overboard. This procedure is

rightfully being discouraged because it is wastage of protein or nitrogenous material of potential utility. The method of handling in Oregon and Washington, however, brings out the singular nature of the shark fishery in that these fish can be taken at good profit to the fishermen for the value of the liver alone. The livers are handled much the same as in California.

If the livers are not to be rendered immediately, they are frozen and held in frozen storage, pending subsequent collection or distribution and extraction.

Trade in Shark Livers.--The method of buying and selling shark livers is outstanding for its lack of uniformity. Oil producers buy direct from the fishermen, through sales representatives of various kinds, or from anyone having livers for sale. Fresh fish houses, cold storage concerns, and liver brokers buy livers direct for subsequent sale at the highest price offered.

In Seattle, livers also are sold over the Halibut Exchange and through a liver pool formed by a group of fishermen and fishing vessel owners. The pool enters into an agreement with an oil producer to handle the catch. The producer advances a minimum price for the livers upon receipt; and, following the sale of the oil, deducts a fixed charge for handling and rendering the livers, a fixed percentage for acting as sales agent, and finally prorates among the fishermen the balance remaining.

Greater uniformity in trading methods will probably react to the benefit of both fishermen and oil producers, the two essential factors in the industry.

Vitamin Content and Value of Shark Livers.--As has been indicated, the vitamin content of shark livers is not the same for all species. In fact there is wide variation in the case of any single species. During December 1941, the vitamin content of female soupfin shark livers was so low in some districts that they brought but $1 per pound as compared to $5 to $6 per pound for male livers. For these reasons it is difficult to arrive at an average vitamin content for the livers of any species without continued study of a large number of samples throughout the entire fishery.

Soupfin shark livers may contain from as low as 30 percent to as high as 70 percent or more oil. The vitamin A potency is known to vary from as low as 20,000 or 30,000 to as high as 200,000 or more units of vitamin A per gram of oil recovered from the livers. It is believed the general average will be in the neighborhood of 60 percent oil, having a potency of approximately 80,000 to 100,000 units per gram.

Dogfish livers generally run from 50 percent to 75 percent oil and vary between 5,000 and 30,000 units of vitamin A per gram of oil, although the greater portion of the landings fall within the 10,000 to 20,000 unit range.

Several samples of hammerhead shark livers have been reported to average around 40 percent oil, having a vitamin potency of approximately 125,000 units per gram.

As stated earlier, the livers of smooth-hound sharks, bay sharks, and great blue sharks fall in the approximate average range of dogfish livers. The livers of the so-called "junk" sharks, while relatively fat, generally yield oils containing below 10,000 units of vitamin A per gram, the bulk of the production probably yielding around 5,000 units.

The value of the liver is predicated upon its total or recoverable vitamin content and can be readily calculated after suitable assay. The price for vitamin A is quoted in terms of a fixed amount per million units of vitamin, depending on the potency of the oil extracted. At present writing, this is about 12 cents per million for oils of about 10,000 units per gram, and as much as 30 cents per million for oils of around 80,000 to 100,000 units per gram. A pound of liver containing 65 percent oil with 10,000 units per gram would contain 2.95 1/million units. This means that an oil producer, if attaining 100 percent extraction, could recover (2.95 x 12 cents) 35.4 cents worth of vitamin A from a pound of livers. The price the producer could afford to pay for such livers would be 35.4 cents less cost of extraction, and the percentage of profit necessary to continue in business. Similarly a soupfin shark liver, having 60 percent oil of 90,000 units would contain 24.5 million units per pound, which, at 30 cents per million, would have a total worth of $7.35. Here again processing losses, operating costs, and profit must be deducted to determine the price which could be paid fishermen. It is readily apparent that at current prices for livers and for vitamin A, the oil extraction business must be carried on in a highly efficient manner to assure any appreciable profit.

1/ $.65 \times 454 \times 10{,}000 = 2{,}950{,}000$ where 454 equals grams per pound.

Manufacture of Shark Liver Oils.--The methods used for extracting vitamins and vitamin oils from fish livers, in most cases, have been held as trade secrets by the oil manufacturer. There is enough general information, based on other research, however, to indicate several possible methods which should give satisfactory results.

Shark livers are extremely fat, having an oil content which may vary from 30 percent to 75 to 80 percent of the total weight of the liver. In such fat livers the oil is readily removed by any action, mechanical, thermal, or chemical, which will break down the liver tissue. Oil so liberated can be recovered by gravity settling or by use of centrifugal separators. Removal of oil, however, does not necessarily assure efficient extraction of the vitamin. This is because a considerable portion of the vitamin is stored in the liver tissue rather than in the oil per se. In view of this, the problem of liver rendering is concerned more with vitamin extraction than oil extraction. This is especially true in the case of livers for which a very high price has been paid and where the operator's margin of profit depends on practically total vitamin recovery.

To accomplish more efficient vitamin recovery, every attempt is made to conduct the process in such a manner that the oil-liberating treatment also frees the vitamin in solution in the liberated oil. If, following the initial oil recovery, considerable vitamin still remains in the liver residue or the residual liver solution, a further vitamin extraction may be made. This can be effected by treating the residue or residual solution with a so-called "wash" oil of low potency. If intimately mixed and agitated with the residue, the wash oil picks up further vitamin, thus increasing in potency and causing greater vitamin recovery. The wash oil is separated off; and if vitamin is still retained by the residue, the wash treatment may be repeated as frequently as is considered economically feasible.

Trade in Shark Liver Oils.--The growth of the shark fishery has been made possible by the development of more diversified and more valuable markets for shark liver oils. Prepared initially for addition to fish body oils for animal consumption, shark liver oils now enter all channels of vitamin A trade. Low potency oils in addition to being used in feed oils are sold in large quantity for conversion into vitamin A concentrates of 100,000 or more units per gram. Such shark liver oil concentrates constitute one of the more important sources of vitamin A for inclusion in vitamin capsules for human consumption and for addition to food stuffs to increase their vitamin A content. The high potency oils, when properly prepared and refined, also may be used in vitamin capsules and can be added direct to food-stuffs. This accounts for their higher value per million units.

The transition from feed oil supplement to high prestige in the pharmaceutical and food market has been no easy task. Initially the oils were considered unacceptable by the trade, primarily on account of the stigma of the word "shark", and could be disposed of only at greatly depreciated prices. The ground work, however, had been carefully laid so when the need for vitamin A became sufficiently acute to require due recognition of these oils, they were not found wanting. The rise of shark liver oil vitamin A from a depreciated price to an equal or preferential position in a rapidly rising market made possible the phenomenal increase in shark liver prices. The foresight, persistence, and pioneering work of the early Pacific Coast shark liver oil manufacturing industry has been vindicated and the greater revenue fishermen are deriving from the industry is closely related to this fact.

Relation of the Shark Fishery to Current War Effort.--Vitamin A is an essential nutritional factor, especially important during time of war. This is demonstrated by the interest of Great Britain in obtaining large supplies of vitamin A under the terms of the Lend-Lease Act. Vitamin A contributes to general good health; resistance to infections, particularly those of the respiratory type; and is essential for good vision, especially at night. In a period of blackouts and night warfare, the significance of the latter property is obvious.

During 1940, domestic fishery by-products industries manufactured 774,027 gallons of fish liver oils. It is estimated that these oils contained a total of approximately 40,000 billion units of vitamin A. Of this amount over 30,000 billion units were prepared on the Pacific Coast, of which approximately 25,000 billion units were from shark liver oils.

Thus, shark liver oils accounted for over 80 percent of the Pacific Coast production of vitamin A and over 60 percent of the vitamin A manufactured in the United States. Data on vitamin A production for 1941 is not yet available. However, due to the increased activity in Washington, Oregon, and California, it is to be expected that the relative importance of the Pacific Coast shark industry will be even greater than during the preceding year.

Under these conditions the industry has become one of considerable national importance and its value to the war effort cannot be overemphasized.

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PASTEURIZATION OF CRAB MEAT--II

By
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The last issue of Fishery Market News contained a report setting forth the results of studies dealing with the pasteurization of crab meat. In this second article additional data for the specific methods of procedure are given.

Pasteurizing crab meat does not call for any changes in the present methods of steaming the crabs and picking out the crab meat. Instead of packing the crab meat in the usual friction-top cans with holes in the bottom, the cans used should be lined with C-enamel, contain no holes, and be provided with covers for sealing with a double seamer. The best size can is the 1/2-flat--307 x 201.25--which contains 1/2-pound or approximately enough crab meat for serving a small family. If the packer supplies a trade which prefers the meat in 1-pound cans, No. 2--307 x 409--cans are recommended.

The cans should be sealed as soon as they are filled and weighed, and placed in ice or a refrigerator until enough have accumulated to fill a retort. The cans then may be dumped into baskets which are used to cook the live crabs. They should not be stacked but should be placed in an irregular manner that will expose the largest possible surface of each can to hot water. The filled baskets are placed in the retort or any other container in which the temperature of the water can be controlled. The water in the retort should be at the proper temperature before the cans are actually placed in it. For example, if the operator decides to pasteurize the crab meat at 170° F. (this temperature is recommended), the water should be heated to 175° prior to placing the cans in it. When the water in the retort has reached this temperature, the baskets of cans should be added and a constant temperature of 175° maintained throughout the pasteurizing period. The 1/2-pound cans should be kept in water at this temperature for 70 minutes, and the 1-pound cans for 103 minutes. Time should be measured from the moment the temperature of the water in the retort returns to 175° after addition of the cans.

Pasteurizing in boiling water is not satisfactory because the crab meat sometimes has a dry appearance where it comes in contact with the inner surface of the can. The 1/2-pound cans should be processed only 25 minutes, and 1-pound cans 53 minutes, if boiling water at 212° F. is used.

When the cans have been processed for the proper length of time they should be transferred to or sprayed with cold water. As soon as the cans feel cool to the touch, they are ready to be iced or placed in a refrigerator with a temperature not higher than 43° F. The length of time the cans should be kept in cold water must be determined by the individual operator, because the temperature of the cold water varies in each plant with the season of the year and the source of the water. After the cans, whether 1-pound or 1/2-pound size, are thoroughly chilled, they are ready for shipment or storage in crushed ice or in a refrigerator.

A crab meat plant needs no additional equipment for pasteurization except a double seamer and a supply of C-enamel lined cans, such as the No. 2 for 1-pound net weight of contents or No. 2 flat for 1/2-pound. The packer should have at least one accurate Fahrenheit thermometer for use in determining the temperature of the water in the retort.

It is necessary to open the cans of the type mentioned above with a can opener. They should be opened only by the consumer and immediately prior to preparation for serving. Cans opened for inspection should not be repacked and resealed, and should not be sold as pasteurized crab meat.

The present cans with holes in the bottom or with friction tops are not suitable because water may enter and contaminate the meat. This would defeat the purpose of pasteurization. The pasteurized crab meat does not become slimy in the cans without holes. There is no excess water present in the cans after they are pasteurized and cooled. Oyster cans, although the tops are sealed with a double-seam cannot be used because the side seams are not soldered and the tops are not fitted with a gasket. They are, therefore, not airtight.

The pasteurization of crab meat in the cans will not make it possible for packers to keep the meat indefinitely. It does not destroy all bacteria. Pasteurization does kill E. coli, pathogenic organisms, and about 99 percent of other micro-organisms. If the crab meat is properly pasteurized and held at a temperature not exceeding 43° F., it will remain in edible condition for at least six weeks.

Sanitary conditions must continue to be maintained throughout the plant. Although crabs are steamed before the meat is picked; it is necessary to pasteurize the meat afterwards, because both pathogenic and non-pathogenic organisms may be introduced from the hands of the pickers, the equipment, and the air, thus causing spoilage. Pasteurization does help the packers to keep their product in good condition by preserving the desirable taste, color, and aroma of the crab meat.

In the experiments reported, parchment or paper liners for the cans were not used because they are not necessary in enameled cans.

The pasteurization of crab meat should be handled as carefully as possible, particularly with regard to maintaining the proper temperature throughout the pasteurization process. A 2-degree variation in the pasteurization temperature and a 2-minute leeway in the pasteurizing time are permissible. Further deviation from the recommended minimum temperatures and times will not successfully pasteurize the crab meat and keep it in edible condition.

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CONSERVATION ORDER M-81 REGULATES USE OF TINPLATE

Under Conservation Order M-81 to conserve the supply and direct the distribution of tinplate and terneplate, salmon; sardines; tuna and tuna-like fishes; mackerel; alewives, including alewife roe; fish flakes (dried fish flakes not to be packed); and crabs are classed as foodstuffs of primary importance and may be packed in "primary products cans". The use of these cans is subject to a minimum of restrictions.

Shad; clams, mussels (whole and minced); oysters; and shrimp are considered to be foodstuffs of secondary importance and may be packed in "secondary products cans". The use of these cans is subject to additional restrictions including the utilization of not more than 100 percent of the tin and/or tinplate and/or terneplate used for packing during the base period in 1940. For refrigeration shipments in fresh condition "secondary products cans" may be used in quantities equivalent to 100 percent of the 1941 pack for oysters, shrimp, clams, scallops, and crabs only when shucked and only in 1-pound, 1-gallon or larger cans. Fish fillets may be packed in "secondary products cans" only in 20-pound or larger sizes in quantities equal to 100 percent of the 1941 pack.

"Special products cans" are also limited in their use and are mainly for important medical, industrial, pharmaceutical, chemical, dental, and miscellaneous supplies.

"Non-essential cans" include all other cans made of tinplate and terneplate and not included in the previous categories. The use of "non-essential cans" is limited to 50 percent of the tin and/or tinplate and/or terneplate during the base period and after March 1 no "non-essential cans" may be used with certain exceptions.

Copies of the Order may be obtained from the Division of Industry Operations, War Production Board.

FISHERY ADVISORY COMMITTEE DISCUSSES WARTIME PROBLEMS

The annual meeting of the Fishery Advisory Committee for the Department of the Interior was held on January 22 and 23 in Washington. Charles W. Triggs of Chicago, Chairman, presided, Mr. F. J. Mullins of the East Bay Fisheries in San Francisco, a new member of the Committee, was present; but the other new member, Mr. David Aylward, President of the National Wildlife Federation of Boston, was unable to attend because of sickness. Twenty members were present for the two days of the meeting, including representatives from all six of the divisions into which the membership is divided for purposes of representation. In addition, several prominent members of the fishery industries were visitors at some of the sessions. Officials of several government agencies, such as the Tariff Commission, OPA, and WPA, were present.

John H. Matthews, Executive Secretary of the Middle Atlantic Fisheries Association of New York, was elected Chairman for the coming year. H. B. Friele, Vice-President of the Nakat Packing Corporation of Seattle, was elected First Vice-Chairman; while Dr. Lewis Radcliffe, Director of the Oyster Institute of North America, with headquarters in Washington, D. C., became Second Vice-Chairman. Ralph Russell, Fishery Economist of the Fish and Wildlife Service, was continued as Secretary.

WARNING TO FISHERMEN - 13th NAVAL DISTRICT*

It is desired that all Fishermen, fishing off shore be warned in advance of enemy approach to our shores. In order to accomplish this, the following methods will be employed:

(a) Plane will fly close to boat and blimp engine three times.

(b) In addition, plane may drop message close to boat. Message will be contained in a tin can, attached to a float light by a fifty foot line. The float light, upon striking the water, will emit dense white smoke. At night it shows a bright flame. The flame is harmless. After it is burned out, the float light body will continue to float. It can then be taken aboard and the message container hauled in.

(c) Boat receiving canned message should notify all other boats in vicinity by visual signal and radio, if radio is available.

(d) Warning message will be broadcast by radio from shore to all boats having radio.

*From memorandum issued by Guy Davis, Chief of Staff, 13th Naval District, Seattle, Washington.

SURPLUS MARKETING ADMINISTRATION PURCHASES 187,496,000 POUNDS OF FISHERY PRODUCTS

During the period from March 15 to November 1941, the Surplus Marketing Administration purchased 187,496,000 pounds of fishery products and 107,000 pounds of vitamin A "Fish liver oil", according to the December issue of National Food Situation, a Department of Agriculture publication. During 1940 purchases of fishery products totaled 2,839,000 pounds. In 1940 and up until mid-March 1941 the commodities were used for domestic distribution to public aid families, for free school lunches, and to meet requirements of the Red Cross for shipment to war refugee areas.

From March 15 through November 30, under the Department of Agriculture's Expanded Purchase Program the commodities could also be used for transfer to other countries under the terms of the Lend-Lease Act or for release upon the domestic market if desirable. Estimated deliveries of canned fish for British shipment from April 29, 1941 to December 31, 1941 amounted to 85,787,949 pounds.

PRELIMINARY INVESTIGATION OF METHODS FOR FREEZING AND STORING FILLETS OF SOME PACIFIC NORTHWEST FISH

A study was undertaken by Maurice E. Stansby and Roger W. Harrison, Service technologists at Seattle, in order to become acquainted with the various problems encountered in the freezing of silver salmon, chum salmon, pink salmon, and "cape" sole, and to obtain some indication as to how these problems might be solved. The most serious changes observed during the experimental work involved changes in color and flavor. It is believed that both of these types of change are largely caused by atmospheric oxidation of the fish oils and pigments, and hence the most urgent problem is one of finding methods of minimizing this oxidation.

Probably the most promising approach to a solution is by means of improved packaging methods whereby less air is left in contact with the packaged fish. Several methods of accomplishing this are possible. Two fillets might be packaged together with the skin side out, thus exposing a minimum of surface. The use of a wrapper which would stick tightly to the flesh, eliminating any air space might also be of benefit. A third possibility is packaging under vacuum in a moisture and air proof container.

The use of a low storage temperature was uniformly successful in minimizing deterioration. Possibly a combination of an improved packaging method with the use of a low storage temperature would provide the solution to the problem of successfully storing pink salmon.

The preliminary brine treatment was highly successful in minimizing drip but caused the development of undesirable off-flavors. It may be possible to work out a treatment which will eliminate these undesirable features and still retain the desired effect. It is also possible that the addition of certain antioxidants or other chemicals to the brining solution would minimize rancidity formation and retard the development of off-colors.

PRELIMINARY INVESTIGATION OF METHODS FOR FREEZING AND STORING FILLETS OF SOME PACIFIC NORTHWEST FISH, may be obtained from the Division of Fishery Industries, Fish and Wildlife Service, Washington, D. C., without charge by requesting Special Scientific Report No. 15.

DECLINE IN ABUNDANCE OF BLUE CRAB STUDIED

A summary of Special Scientific Report No. 16 by John Pearson, Service biologist, reveals that:

1. The commercial production of the blue crab in Chesapeake Bay has probably declined during 1940 and 1941 at least 50 percent compared to the production of 57 million pounds in 1939.

The principal types of fishing gear used for crabs have shown a reduced yield per unit of effort during 1940 and 1941, compared to 1939. The scrape and dip net, utilized in the soft crab fishery, show the greatest decline.

3. The first indication of depletion of crabs is evident in a lower average daily catch per dredge boat in lower Virginia for the month of December 1939, compared to December 1938. The decline followed a year of high productivity (1939) in the crab fishery throughout Chesapeake Bay.
4. An abnormally low catch of both hard and soft crabs occurred in May 1940, following the second coldest January on record for the Chesapeake Bay region. Large quantities of crabs were reported to have been killed by this severe weather, especially the wintering adult female crabs at the mouth of the bay.
5. The lack of an adequate spawning reserve of females during the summer of 1940 appears to have been reflected in a continued decline in the abundance of soft crabs (1-year-old individuals) during 1941.
6. Preservation of all sponge crabs, although an excellent protective measure, may not be absolutely necessary to insure sufficient reproduction to provide for a self-perpetuating and profitable crab fishery.
7. Recommendations are made for the preservation and restoration of the supply of crabs, including the establishment of crab sanctuaries, enforcement of laws governing size limits, and prohibiting the retention of green crabs in shedding floats; for the collection of detailed fishery statistics by the States, and the conduct of continuous cooperative biological investigations.

Special Scientific Report No. 16, "Decline in Abundance of the Blue Crab, Callinectes sapidus, in Chesapeake Bay during 1940, and 1941, with Suggested Conservation Measures", by John C. Pearson, may be obtained without charge from the Fish and Wildlife Service, Washington, D. C.

SERVICE REPORT ISSUED WITH SPECIAL REFERENCE TO CHESAPEAKE BAY SEA TROUT

Plankton collections made by John C. Pearson, Aquatic Biologist, Fish and Wildlife Service, at the mouth of Chesapeake Bay, Va., yielded specimens of 45 species of marine fishes that were recognized. As a result of these weekly collections during the summer and biweekly collections during the winter, from May to October 1929, from April to December 1930, and during January and March 1931, sufficient data were acquired to provide distributional and descriptive data on 31 of the 45 species recognized.

Larval and postlarval stages of the gray sea trout, or weakfish, Cynoscion regalis; the bluefish, Pomatomus saltatrix; the butterfish, Poronotus triacanthus; the harvestfish, Peprilus alepidotus; and the stargazer, Astroscopus guttatus, are described and illustrated.

Collections of juvenile gray sea trout by seine and trawl indicate that this food fish attains an average total length of 16 to 20 cm. (6.3 to 7.9 inches) at the end of its first year of growth in lower Chesapeake Bay.

THE YOUNG OF SOME MARINE FISHES TAKEN IN LOWER CHESAPEAKE BAY, VIRGINIA, WITH SPECIAL REFERENCE TO THE GRAY SEA TROUT Cynoscion regalis (BLOCH), Fishery Bulletin No. 36, may be obtained from the Superintendent of Documents, Washington, D. C., for 10 cents.

METHOD DEVISED FOR RECORDING COLOR OF FISH FILLETS

To compare the color of opaque objects such as fish fillets, Maurice E. Stansby and John A. Dassow, Service technologists, prepared photographic color transparencies and obtained spectral distribution curves, using a photo-electric spectrophotometer. Errors due to variations in illumination during exposure and in processing of the film were eliminated by taking pictures of objects to be compared on the same negative.

A more complete report on their work entitled "Recording Color of Opaque Objects" appeared in Industrial and Engineering Chemistry, Analytical Edition, January 15, 1942.

USE OF LIME IN CONTROLLING STARFISH

The STARFISH (Asterias forbesi Desor) is one of the most destructive enemies of shellfish on the Atlantic Coast of North America, the extent of its damage to the oyster industry of Long Island Sound alone being estimated at $500,000 a year. Efforts to eradicate this pest, though made for at least a century, have been largely unavailing.

The method of combating starfish, presented by Victor L. Loosanoff, Director, Fishery Biological Laboratory, Milford, Conn., and James B. Engle, Oyster Culturist, Fish and Wildlife Service, in the Service's Research Report No. 2, suggests the use of quicklime, the destructive effect of which is produced by direct contact. Particles of the chemical spread over oyster beds quickly sink to the bottom, and, falling on the starfish, are imbedded in the delicate skin. The caustic action of slaking lime disintegrates the membrane, and the lesions rapidly increase in size. After several days the wounds penetrate the body wall and expose the internal organs. Death usually follows in a short time.

Once spread over the oyster beds, the lime retains its effectiveness for some time. Starfish not hit directly by the descending particles will eventually come in contact with them when crawling along the bottom. In the course of time their lower surfaces will become affected and disintegration will begin. The cheapness of lime, the simplicity of its application, and its comparative harmlessness to oysters and many other commercial species all indicate that it is a practical weapon for use against the inroads of starfish on oyster beds.

USE OF LIME IN CONTROLLING STARFISH, Fish and Wildlife Service Research Report No. 2, may be obtained from the Superintendent of Documents, Washington, D. C., for 10 cents.

WHOLESALE AND RETAIL PRICES

During the week ending January 31 the Bureau of Labor Statistics' comprehensive index of nearly 900 wholesale price series rose 0.4 percent to 95.9 percent of the 1926 average, the highest level since September 1929. In the previous 4 weeks the index gained 1.7 percent and was 19 percent above the corresponding week of 1941.

In 51 cities the average price of a 1-pound tall can of pink salmon in mid-December was 20 cents, the same as in November, but 27 percent higher than in December a year ago. The average retail price for red salmon was 36.9 cents per 1-pound tall can as compared with 36.3 cents a month earlier and 41 percent greater than the price in December 1940.

NEW ENGLAND LANDINGS REACH ALL-TIME HIGH IN 1941

December deliveries by fishing vessels at the ports of Boston and Gloucester, Mass., and Portland, Maine, continued above normal with over 28 million pounds of fishery products, valued at $1,192,664 being landed during the month. Total landings of all species during 1941 amounted to 473,496,428 pounds, valued at $15,351,211, establishing new records for both the volume and the value of the catch. The previous high for landings occurred in 1936 and the highest value previously received by the fishermen was in 1929.

Landings by Fishing Vessels at Boston and Gloucester, Mass., and Portland, Me.

Species	December 1941		November 1941		December 1940		Twelve months ending with -- December 1941		December 1940	
	Pounds	Cents*	Pounds	Cents*	Pounds	Cents*	Pounds	Cents*	Pounds	Cents*
Cod	3,887,596	5.22	7,460,612	4.33	5,095,654	4.12	75,034,291	3.56	61,411,422	3.43
Haddock	7,425,428	6.13	6,879,350	5.69	6,245,449	4.90	147,229,347	4.13	120,457,103	3.71
Hake	338,397	5.29	636,205	4.34	479,985	4.52	5,162,667	3.99	6,005,971	3.27
Pollock	7,998,871	3.21	10,036,028	2.57	7,927,793	1.99	33,579,895	2.85	32,039,694	2.11
Cusk	286,620	4.47	559,076	3.69	648,791	3.34	4,374,288	3.38	6,014,102	2.94
Halibut	14,005	22.31	23,038	23.52	15,849	21.76	711,197	16.05	956,166	14.83
Mackerel	327,375	4.57	662,495	6.63	131,930	6.72	24,896,371	2.60	20,725,984	2.01
Flounders:										
Gray sole	335,075	5.82	287,385	5.09	409,824	5.05	4,431,418	4.78	6,024,164	4.24
Lemon sole	88,360	12.52	97,735	11.21	102,865	11.08	2,382,671	7.33	2,105,481	6.99
Yellowtail	539,800	3.03	460,609	2.77	1,280,505	1.61	5,195,244	2.36	6,982,603	1.85
Blackback	111,070	5.61	148,625	4.82	123,425	4.54	1,275,263	4.15	1,298,445	4.06
Dab	337,340	4.23	211,900	3.61	269,275	2.26	3,678,201	2.95	3,486,511	2.38
Other	155	-	580	-	6,460	-	40,974	-	363,685	-
Swordfish	-	-	-	-	-	-	474,535	29.26	791,637	21.51
Rosefish	6,408,750	2.36	8,803,580	2.08	7,351,136	2.07	139,352,785	2.03	83,781,222	1.50
Tuna	-	-	-	-	-	-	144,967	6.00	249,884	4.98
Whiting	24,175	4.52	449,372	3.14	5,040	2.14	22,360,411	2.09	16,736,487	1.23
Wolffish	37,137	5.78	37,820	5.38	42,110	4.79	1,046,888	3.84	890,386	3.43
Scallops (meats)	19,659	31.04	211,626	29.37	168,574	18.17	1,590,436	21.57	1,257,410	16.37
Other	16,507	-	78,277	-	10,109	-	534,579	-	854,064	-
Total	28,196,320	4.23	37,044,313	3.75	30,314,774	3.23	473,496,428	3.24	372,432,421	2.89

* Weighted average of prices per pound paid to fishermen.

FISHERIES OF MAINE

A proposal to extend their sardine packing season to an all year basis was under study by a Maine legislative committee, according to mid-January report of the Service's agent in Maine. The existing law permits the activity only between April 15 and December 1. Proponents of the new measure indicate the extended season is warranted by increased home market demands resulting from war-caused decreases in imports. Most packers probably will not operate in winter months, but hope to open earlier in spring.

Although fishing along the smaller coastal harbors and communities has been currently rather quiet, clams are in good demand with prices very favorable as compared with previous years.

MAINE FISHERMEN STUDY CREDIT UNIONS - AND ORGANIZE

Formation of a new credit union in the island town of Vinalhaven, Maine, and the appearance of discussion groups working toward similar organizations in three other villages indicate an increase of cooperative activity among Maine fishermen.

Following six months of study in weekly discussion meetings, a group of Vinalhaven residents recently applied to the Credit Union Department of the Farm Credit Administration for a charter to operate as the Vinalhaven Federal Credit Union, a cooperative savings and loan association.

The charter was granted, and Ralph Earle of Vinalhaven was elected chairman of the board of directors. Birger Magnuson, lobster fisherman and president of the Fishermen's Cooperative Association, which was incorporated in Vinalhaven three years ago, is an original member of the new credit union and serves on its board of directors.

Discussion groups studying credit union technique are under way in Port Clyde, Orr's Island, and Bass Harbor. Gustavus Anderson of Port Clyde, and Carl Linscott of Orr's Island, both lobster fishermen, are the chairmen of their respective groups.

Both the new credit union and the discussion groups are a result in large part of the work of the Extension Department of the Eastern Cooperative League, under the leadership of

Mary Arnold, director. Her efforts for more than a year have been devoted to encouraging cooperative organizations among Marine Fishermen as a means of solving their economic problems by their own efforts. Miss Arnold has continually emphasized the need of the financial resources and economic self-sufficiency that can be attained through credit unions.

FISHERIES OF MASSACHUSETTS

Bad weather, plus withdrawal of draggers for the southern trawl fishery after Christmas, combined to pull Gloucester rosefish receipts down in January. What few fish did come into Gloucester sold as high as $3.50 a hundred, according to the Service's local agent.

Anticipating even more acute labor shortages with the coming summer, there is talk of breaking in girls at the cutting table to fillet rosefish.

FISHERIES OF FLORIDA

Continuing cold weather during mid-January made pompano available, and good catches were reported near Cape Canaveral, according to the Service's agent in Florida.

In Miami and Keys areas, as elsewhere in the country, there has been a noticeable withdrawal of members engaged in the fisheries to war service or war industries.

There has been continued activity in spiny lobster and stone crab fishing, with both bringing good prices, and the latter very scarce. Spiny lobstermen are using discarded 42-gallon oil drums - removing the head and sinking them in six to eight feet of water. Drawn up weekly, the "pots" are proving efficient. Cool and dark inside, the drums are haven from all foes but the fishermen.

A good run of pompano was reported around Ft. Pierce. Wholesale prices have been much steadier and slightly higher than during the past two years.

FISHERIES OF THE GREAT LAKES

Labor shortages occurring on the New York shores of Lake Erie are being effectively taken care of in part, at least, by the hiring of women, according to the Service's agent in that region. This is especially true in the case of gill-net tug activities. There are apparently a number of operations on these boats which women can manage - piling nets in boxes, for example; setting nets; picking and cleaning fish; reeling and mending nets; and other jobs not requiring heavy lifting. It is reported that women can replace about 70 percent of crews on lake fishing vessels and on shore, if necessary.

Reports from fishermen indicate that smelt have increased about 200 percent in Lake Erie, on a basis of catches made by nets this year as compared with last.

Lamprey eels are on the increase - some up to 19 inches in length - especially in Niagara River and Lake Ontario.

Commercial fishing in Niagara River is devoted entirely to hook fishing for sturgeon. The fish come out of the lake and go into the river and shoals to spawn, and then are either snagged by hooks set near the bottom or take baited hooks. During the past few years, poor catches have been reported; in many instances, fishermen were unable to get back their investment. One fish may make the difference between profit or loss, as $120 has been received from one female spawner.

Prices on sturgeon have been very high this past season, due to the shortage of Russian sturgeon and caviar. During 1940, fishermen received from 35¢ to 40¢ per pound for sturgeon meat, and from $1.00 to $1.25 per pound for the roe; but during 1941, meat netted from 40¢ to 50¢ per pound, with the roe selling for $3.00 per pound. New York City is the main market.

In one town of 23,000 population, a very successful deep-fat fried fish firm is putting out 700 extra pounds of fish per week to a newly created market. To get a serving of their fish, the housewife telephones her order. It comes ready to eat, delivered by a boy on a bicycle. Local stores also periodically feature these fried fish, and some are shipped to nearby towns. Blue pike, yellow perch, and haddock fillets are most popular sellers.

CHICAGO RECEIPTS FOR 1941 10 PERCENT ABOVE 1940

December receipts by Chicago wholesalers were marked by a greatly increased volume of saugers, yellow perch and shell oysters. The last month of the year normally is the peak or near-peak month for these varieties, according to the Service's local Market News office.

Receipts of Fishery Products at Chicago

Item	December 1941	Dec. 1941 compared with Nov. 1941	Dec. 1941 compared with Dec. 1940	12 months Jan.-Dec. 1941	12 mo. 1941 compared with 12 mo. 1940
Classification:	Pounds	Percent	Percent	Pounds	Percent
Fresh-water fish	2,706,000	+ 1	-10	33,399,000	+ 5
Salt-water fish	1,972,000	- 8	+42	21,564,000	+33
Shellfish, etc.	1,409,000	- 2	- 7	10,606,000	- 8
Total receipts	6,087,000	- 3	+ 3	65,569,000	+10
Leading items:*					
Lake herring	397,000	- 46	-32	3,180,000	-12
Lake trout	437,000	- 36	+12	6,110,000	+ 2
Sauger	506,000	+322	+ 2	4,903,000	+39
Whitefish	240,000	- 6	+21	3,682,000	- 8
Yellow perch	522,000	+165	+79	3,410,000	+15
Rosefish fillets	274,000	- 16	+75	4,511,000	+40
Oysters, shell	213,000	+204	+39	718,000	-20
Shrimp	888,000	- 18	+12	7,026,000	- 7
Leading sources:					
Illinois	290,000	+134	-26	1,863,000	- 9
Louisiana	666,000	+ 10	- 3	4,406,000	-28
Massachusetts	696,000	- 9	+19	9,016,000	-46
Michigan	515,000	- 7	+36	6,120,000	-13
Wisconsin	675,000	- 24	- 4	8,039,000	+ 3
Domestic total	4,581,000	- 7	+ 5	45,872,000	+ 9
Imported total	1,506,000	+ 15	- 2	19,697,000	+14
Transported by:					
Truck	2,408,000	+ 10	- 4	25,543,000	+20
Express	829,000	- 25	- 2	15,863,000	-15
Freight	2,850,000	- 4	+11	24,163,000	+24

* Includes fresh and frozen fish.

FROZEN FISH TRADE

Holdings of Frozen Fish Show First Decline since September

Holdings of frozen fishery products in domestic cold-storage plants totaled 97,247,000 pounds on January 15, showing a decrease of 17 percent from the previous month, according to data collected by the Agricultural Marketing Service. This was the first month since September 1941 that the holdings have fallen below 100 million pounds.

Holdings of Fishery Products in the United States

Item	Jan. 15 1942	Jan. 15 compared with Dec. 15 1941	Jan. 15 1941	5-yr. av. Jan. 15	Dec. 15 1941	Jan. 15 1941	5-yr. av. Jan. 15
	Pounds	Percent	Percent	Percent	Pounds	Pounds	Pounds
Frozen fish and shellfish:							
Total holdings	97,247,000	-17	+ 12	+ 21	117,805,000	86,880,000	80,646,000
Important items:							
Croakers	2,204,000	-32	+214	+177	3,227,000	701,000	796,000
Cod fillets	2,409,000	-25	- 8	+ 15	3,233,000	2,621,000	2,094,000
Haddock fillets	7,262,000	-19	+ 43	+ 39	9,007,000	5,066,000	5,208,000
Pollock fillets	4,079,000	-21	- 33	- 22	5,148,000	6,128,000	5,236,000
Rosefish fillets	3,214,000	-32	+120	+ 17	4,707,000	1,460,000	2,747,000
Flounders	1,179,000	-16	+ 3	+ 85	1,408,000	1,144,000	637,000
Halibut	8,829,000	-21	+ 16	+ 32	11,155,000	7,607,000	6,685,000
Mackerel	5,951,000	-21	- 3	+ 30	7,526,000	6,132,000	4,589,000
Mullet	1,890,000	-14	+105	*	2,207,000	922,000	*
Sablefish	1,714,000	-11	- 30	- 18	1,929,000	2,441,000	2,082,000
Salmon	9,318,000	-19	0	+ 3	11,533,000	9,364,000	9,016,000
Whiting	7,849,000	-25	- 9	- 15	10,496,000	8,663,000	9,202,000
Lake herring	2,520,000	-28	0	+ 6	3,495,000	2,509,000	2,376,000
Whitefish	1,501,000	- 9	- 26	+ 2	1,656,000	2,033,000	1,472,000
Scallops	1,071,000	-26	- 30	*	1,444,000	1,520,000	*
Shrimp	8,775,000	-10	+ 51	*	9,722,000	5,808,000	*
Cured fish:							
Herring, cured	10,267,000	- 2	- 38	- 30	10,437,000	16,609,000	14,761,000
Salmon, mild-cured	5,777,000	-17	+ 40	- 2	6,935,000	4,116,000	5,883,000

*Data not available.

Freezings of Fishery Products Decrease in January

Cold-storage plants in the United States and Alaska froze 8,569,000 pounds of fish and shellfish during the month ending January 15, according to Agricultural Marketing Service data. Freezings of all principal items, with the exception of haddock fillets, showed marked declines as compared to the previous month, but in most instances were greater than for the same period a year ago and the 5-year average.

Freezings of Fishery Products in United States Cold-storage Plants
(Figures are for the month ending on the date indicated)

Item	Jan. 15 1942	Jan. 15 compared with Dec. 15 1941	Jan. 15 1941	5-yr. av. Jan. 15	Dec. 15 1941	Jan. 15 1941	5-yr. av. Jan. 15
	Pounds	Percent	Percent	Percent	Pounds	Pounds	Pounds
Total fish and shellfish	8,569,000	-60	+ 6	+ 5	21,584,000	8,077,000	8,185,000
Important items:							
Cod fillets	75,000	-80	+ 7	- 66	373,000	70,000	218,000
Haddock fillets	1,036,000	+32	+ 130	+ 48	787,000	450,000	702,000
Pollock fillets	536,000	-86	- 59	- 56	3,892,000	1,318,000	1,216,000
Rosefish fillets	1,152,000	-35	- 19	- 12	1,775,000	1,430,000	1,308,000
Mackerel	237,000	-28	+1217	+ 76	327,000	18,000	135,000
Sablefish	120,000	-74	+ 135	+135	468,000	51,000	51,000
Salmon	260,000	- 8	+ 7	+ 55	283,000	244,000	168,000
Whiting	453,000	-50	+ 233	+ 45	914,000	136,000	313,000
Lake herring	307,000	-88	- 15	+ 4	2,634,000	363,000	296,000
Lake trout	142,000	-78	+ 184	+129	647,000	50,000	62,000
Shrimp	987,000	-70	+ 107	*	3,331,000	476,000	*

*Data not available.

Boston Cold-storage Holdings Drop 29 percent in January

Most frozen fishery products moved out of Boston warehouses in considerable volume during the first four weeks in January due both to the usual seasonal trend and the large decrease in landings of fresh fish due to a controversy over war risk insurance, according to the Service's local Market News office. Smelt holdings were an exception, this variety building toward the spring peak which was attained in March last year and amounted to well over one million pounds.

Whiting holdings in 15 Maine and Massachusetts warehouses declined from 4,917,000 pounds on December 27 to 2,822,000 pounds on January 24. Stocks on the latter date were made up of 1,180,000 pounds of dressed whiting, H & G whiting, fillets, and skuljoes; and 1,599,000 pounds of round whiting--the balance being classed as animal food.

Boston Cold-storage Holdings

Item	Jan. 28, 1942	Jan. 28 compared with Dec. 31, 1941	Jan. 28 compared with Jan. 29, 1941	Dec. 31, 1941	Jan. 28, 1941
	Pounds	Percent	Percent	Pounds	Pounds
Total fish and shellfish	11,193,000	- 29	- 14	15,776,000	13,049,000
Leading items:					
Fillets:					
Cod	597,000	- 49	- 46	1,161,000	1,102,000
Haddock	1,394,000	- 51	- 15	2,823,000	1,637,000
Pollock	1,952,000	- 27	- 33	2,689,000	2,908,000
Mackerel	2,167,000	- 26	- 9	2,938,000	2,374,000
Smelt	587,000	+169	+ 9	218,000	541,000
Shrimp	633,000	+ 17	+116	541,000	293,000

New York Cold-storage Holdings Down 13 percent in January

In accordance with the usual seasonal trend for the country as a whole New York cold-storage stocks were appreciably lower at the end of January when compared with four weeks earlier. The net declines were 14 percent for salt-water fish, 6 percent for fresh-water fish and 13 percent for shellfish, according to the Service's New York Market News office.

New York Cold-storage Holdings

Item	Jan. 29, 1942	Jan. 29 compared with Dec. 31, 1941	Jan. 29 compared with Jan. 30, 1941	Dec. 31, 1941	Jan. 30, 1941
	Pounds	Percent	Percent	Pounds	Pounds
Total fish and shellfish	9,839,000	-13	+ 13	11,278,000	8,744,000
Leading items:					
Butterfish	634,000	-14	+113	734,000	297,000
Halibut	733,000	+27	+205	576,000	240,000
Mackerel	618,000	-27	- 5	850,000	650,000
Salmon, king (chinook)	565,000	-12	- 24	642,000	741,000
Whitefish	584,000	-13	- 59	673,000	1,428,000
Shrimp	1,276,000	+ 4	+ 45	1,232,000	878,000

Chicago's Cold-storage Holdings Practically Unchanged in January

Chicago's cold-storage stocks increased 1 percent during January while those for the country as a whole were dropping. The gain was due mainly to the advent of the sauger season and consequent increased freezings, and also increased receipts of frozen salt-water species such as rosefish fillets, halibut and silver salmon, according to the Service's local Market News office.

Chicago Cold-storage Holdings

Item	Jan. 29, 1942	Jan. 29 compared with Dec. 31, 1941	Jan. 29 compared with Jan. 30, 1941	Dec. 31, 1941	Jan. 30, 1941
	Pounds	Percent	Percent	Pounds	Pounds
Total fish and shellfish	7,886,000	+ 1	+ 47	7,801,000	5,350,000
Leading items:					
Blue pike and sauger	358,000	+51	+ 61	237,000	223,000
Lake herring	695,000	- 6	0	742,000	695,000
Lake trout	594,000	-10	+ 13	658,000	524,000
Rosefish fillets	436,000	+14	+304	381,000	108,000
Halibut	963,000	+14	+ 90	843,000	506,000
Silver salmon	238,000	+21	+134	196,000	102,000
Shrimp	1,262,000	-10	+ 48	1,403,000	850,000

Canadian Stocks of Fresh Frozen Fish Decline 5,637,000 Pounds in January

Canadian cold-storage plants held 21,488,000 pounds of fresh frozen fish on February 1, 1942, according to preliminary information released by the Dominion Bureau of Statistics. This was a decline of 21 percent as compared with both the previous month and the same date last year. Items showing marked declines were cod fillets, salmon, mackerel, and tullibee. Due largely to increased holdings of smoked groundfish fillets, stocks of frozen smoked fish on February 1 were 13 percent above those for the same date in 1941.

Canadian Cold-storage Holdings

Item	Feb. 1, 1942	Feb. 1 compared with Jan. 1, 1942	Feb. 1 compared with Feb. 1, 1941	Jan. 1, 1942	Feb. 1, 1941
	Pounds	Percent	Percent	Pounds	Pounds
Frozen fresh fish					
Total holdings	21,488,000	-21	-21	27,125,000	27,280,000
Important items:					
Cod fillets	903,000	-60	-55	2,230,000	2,023,000
Salmon	5,449,000	-26	-27	7,353,000	7,475,000
Sea herring	5,329,000	- 1	-16	5,359,000	6,354,000
Halibut	2,728,000	-39	- 4	4,440,000	2,830,000
Mackerel	414,000	-56	-69	947,000	1,350,000
Whitefish	815,000	+14	+41	718,000	579,000
Pickerel	852,000	+28	- 7	664,000	918,000
Tullibee	622,000	-15	-35	736,000	962,000
Frozen smoked fish					
Total holdings	1,622,000	-29	+13	2,290,000	1,437,000
Important items:					
Finnan haddie	206,000	-12	+ 8	235,000	190,000
Fillets: Cod, haddock, etc.	830,000	-30	+34	1,178,000	621,000
Sea herring kippers	480,000	-35	+ 8	744,000	446,000

Canadian Freezings of Sea Herring Heavy

Sea herring accounted for nearly one-half of the total poundage of fresh fish frozen by Canadian freezers during January, according to preliminary information released by the Dominion Bureau of Statistics. Due principally to the heavy freezings of this species the total poundage of fresh frozen fish produced during the month increased 41 percent as compared with the same month last year.

Freezings of Fishery Products in Canadian Cold-storage Plants

Item	January 1942	January compared with Dec. 1941	January compared with Jan. 1941	December 1941	January 1941
	Pounds	Percent	Percent	Pounds	Pounds
Frozen fresh fish					
Total freezings	3,492,000	+ 35	+ 41	2,581,000	2,482,000
Important items:					
Cod:					
Whole	89,000	+ 41	+ 89	63,000	47,000
Fillets	711,000	- 36	- 30	1,115,000	1,018,000
Salmon	192,000	+392	+449	39,000	35,000
Sea herring	1,646,000	+314	+390	398,000	336,000
Pickerel	30,000	- 53	- 21	64,000	38,000
Frozen smoked fish					
Total freezings	351,000	- 39	- 62	571,000	918,000
Important items:					
Finnan haddie	119,000	- 6	- 34	127,000	180,000
Fillets: Cod, haddock, etc.	119,000	- 63	- 87	320,000	637,000
Sea herring kippers	113,000	- 2	+ 66	115,000	68,000

CANNED FISH TRADE

Quarterly Canned Foods Stock Report for January 1, 1942

Distributors' stocks of canned fruits and vegetables were substantially greater on January 1, 1942 than a year earlier, but canners' stocks of canned vegetables were, in general, sharply under their holdings on January 1, 1941, according to the quarterly report on canners' and distributors' stocks of canned foods prepared by the Bureau of Census in cooperation with the National Canners' Association and the Association of Pacific Fisheries.

A downward trend in canners' unsold stocks of salmon continued, the decrease for all varieties combined amounting to 32 percent. This decrease from a year ago reflected the decline of 97 percent in Alaska Reds. Pinks were off 4 percent from last year. In contrast with recent experiences, distributors' stocks of salmon were up one-tenth from a year ago, the increase occurring only in stocks of pinks. Stocks of both California and Maine sardines were sharply above those of a year ago while those of tuna were about halved.

Distributors' Stocks of Canned Fish in number of cases, (all sizes) sold and unsold*

Commodity	January 1, 1942	Jan. 1, 1942 compared with Oct. 1, 1941	Jan. 1, 1942 compared with Jan. 1, 1941	October 1, 1941	January 1, 1941
	Cases	Percent	Percent	Cases	Cases
Salmon, total	407,665	+42	+10	286,662	370,943
Reds	119,240	+59	- 3	75,062	123,416
Pinks	209,952	+31	+27	160,773	165,827
Other	78,473	+54	- 4	50,827	81,700
Tuna	74,626	0	-52	74,948	153,889
Sardines, total	220,494	+17	+38	188,455	159,929
California	126,254	+51	+37	83,491	92,287
Maine	88,360	- 8	+83	95,692	48,273
Imported	5,880	-37	-70	9,272	19,369

* Based upon reports to the Bureau of the Census from the same firms for each date.

Unsold Salmon Stocks Dwindle

Unsold stocks of canned salmon in the hands of canners on January 31 numbered less than 300,000 cases, approximately one-half of last year's corresponding holdings, according to the Association of Pacific Fisheries monthly report.

Canned Salmon Unsold--Standard Cases

Item	January 31, 1942	December 31, 1941	January 31, 1941
Chinook or king	36,277	97,731	57,167
Puget Sound sockeye	20,949	40,514	36,280
Alaska red	11,479	27,554	153,762
Coho, silver, and medium red	3,230*	5,630*	84,834
Pink	139,469	355,925	213,006
Chum	79,914	116,862	43,731
Blueback	400	600	555
Steelhead	3,781	5,185	4,106
Total	295,499	650,001	593,441

*Does not include coho talls.

Canned Salmon Quotations Being Withdrawn

Some of the varieties and can sizes listed below are no longer available, having been sold out and most quotations are being withdrawn by canners due to the uncertain aspects for the 1942 season, according to the Service's Seattle Market News office. The quotations are f.o.b. Pacific Coast shipping points as reported by Seattle brokers and shippers.

Canned Salmon Quotations--Per Dozen Cans

Variety		Can size	Feb. 2 1942	Jan. 1 1942	Feb. 1 1941
Chinook or king (Columbia River)	Fancy	1-lb. flat	$4.50-5.00	$4.50-4.60	$4.35
		½-lb. flat	2.70-3.00	2.60	2.50
	Pale	1-lb. tall (fall-pack)	1.85	1.85	1.50
	do	1-lb. flat do	2.25	2.25	-
	do	½-lb. flat do	1.25	1.25	1.00
Alaska red		1-lb. tall	4.00*	3.75	2.65-2.75
		1-lb. flat	-	3.70	3.00
		½-lb. flat	-	-	1.65-1.75
Coho and medium red		1-lb. tall	-	3.00	1.85-2.25
		1-lb. flat	-	2.50	2.15-2.25
		½-lb. flat	-	1.80-2.00	1.35
Chum		1-lb. tall	1.85-1.90	1.75	1.45-1.40
		½-lb. flat	1.25	1.10-1.15	.90
Pink		1-lb. tall	2.00	1.75-1.85	1.55-1.65
		1-lb. flat	-	1.90-2.00	1.75
		½-lb. flat	-	1.20-1.25	1.00-1.05
Puget Sound sockeye		1-lb. flat	4.50	4.00-4.50	3.50-3.70
		½-lb. flat	2.50-3.00	2.50	2.10-2.25

* Resale.

Shrimp Pack 24 percent Below 5-Year Average on January 31

Less shrimp was packed in January than during the same month last year and the pack was still well behind recent years according to the report of the Service's Market News office in New Orleans based on the output of canneries operating under the Seafood Inspection Service of the Food and Drug Administration.

Wet and Dry Pack Shrimp in all Sizes in Tin and Glass--Standard Cases

1941 - 1942			1940 - 1941		5-yr. average
Dec.28-Jan.31	Nov.30-Dec.27	July 1-Jan.31	Dec.29-Feb.1	July 1-Feb.1	July 1-Feb. 1
42,492	72,446	730,826	52,230	885,177	965,765

Prices for canned shrimp, f.o.b. point of production, in No. 1, plain tall tins, stiffened slightly during January with a number of packers reporting that, due to the small pack, they have withdrawn from the market for several months.

Canned Shrimp Prices - Per Dozen Tins

Item	February 1, 1942	January 1, 1942	February 1, 1941
WET PACK			
Small	$1.85-2.00	$1.75-2.00, few 1.70	$1.10-1.15
Medium	1.95-2.10	1.85-2.10, few 1.80	1.15-1.25
Large	2.00-2.25	1.95-2.15, some 1.90-2.20	1.20-1.30
Extra Large or Jumbo	2.10-2.35	2.10-2.25, some 2.00-2.35	1.25-1.35
DRY PACK			
Small	$1.85-2.00	$1.80-2.00, few 1.70	$1.10-1.15
Medium	1.95-2.10	1.85-2.10, few 1.80	1.15-1.25
Large	2.00-2.25	1.95-2.15, some 1.90-2.20	1.20-1.30
Extra Large or Jumbo	2.10-2.35	2.10-2.25, some 2.00-2.30	1.25-1.35

1941 Packs of Tuna and Mackerel Show Large Decline

California canners packed 2,785,957 standard cases of tuna and 842,970 standard cases of mackerel during 1941, according to information released by the California Bureau of Marine Fisheries. This is a decline of 33 percent in the pack of tuna and 40 percent in the pack of mackerel as compared with the previous year.

Although the production of canned tuna decreased by one-third as compared with 1940, the pack was the fourth largest in history. The pack of mackerel was one of the smallest in recent years. During the period from 1934 to 1940, inclusive, the pack of this species averaged over 1,200,000 cases annually.

California Pack of Tuna and Mackerel--Standard Cases 1/

Item	December 1941	November 1941	December 1940	Twelve mos. ending with December 1941	Twelve mos. ending with December 1940
	Cases	Cases	Cases	Cases	Cases
Tuna:					
Albacore	30	3	930	103,262	154,282
Bonito	2,581	4,258	4,041	224,513	108,144
Bluefin	-	-	-	177,059	327,581
Striped	32,415	23,073	67,715	439,729	877,869
Yellowfin	159,218	92,127	140,803	1,456,162	2,002,898
Yellowtail	2,633	2,979	5,119	156,479	85,367
Flakes	17,445	13,718	206,318	190,935	423,331
Tonno style	493	-	5,649	37,818	182,864
Total	214,815	136,158	430,575	2,785,957	4,162,336
Mackerel	54,189	174,376	153,065	842,970	1,395,218

1/ Standard cases of tuna represent cases of 48 7-ounce cans, while those of mackerel represent cases of 48 1-pound cans.

California Sardine Landings in January Below Same Month Last Year

Although the sardine catch for the season was well ahead of last year's production January's totals for landings, case pack and by-products were much below the same month last year, according to California Sardine Institute and Division of Fish and Game figures.

California Sardine Landings, Canned Pack, and Byproducts

Item	Unit	Month 1941-1942	Month 1941	Month 1940-1941	Season from Aug. 1 to -- 1941-1942	Season from Aug. 1 to -- 1940-1941
		Dec.27-Jan.30	Nov.29-Dec.26	Dec.28-Jan.31	Jan.30	Jan.31
Landings	Tons	36,979	31,893	73,193	550,718	405,426
Canned (48 lbs.)	Std.Cases	487,013	362,518	664,387	4,796,911	2,674,362
		December	November	December	Dec.31	Dec.31
Meal	Tons	3,736	21,144	13,024	76,217	54,443
Oil	Gals.	514,916	4,281,671	2,321,406	15,844,901	10,800,488

Canned California sardine quotations, f.o.b. California shipping points, as reported to the Service's Seattle Market News office, increased 15 to 30 cents per case during January.

Canned California Sardine Quotations--Per Case

Item	Cans per case	February 1, 1942	January 1, 1942	February 1, 1941
Tomato or mustard sauce:				
1-lb. oval	48	$4.40	$4.25-$4.30	$3.00-$3.40
1-lb. tall	48	3.60	3.40- 3.50	2.50- 2.65
Natural:				
1-lb. oval	48	4.30	4.00- 4.15	3.00- 3.40
1-lb. tall	48	3.35	3.15- 3.25	2.15- 2.25

Sardine meal with 65 to 67 percent protein was quoted at $75 to $81 per ton on February 1 as compared with $70 per ton a month earlier and $50 to $52.50 per ton a year ago. Quotations on sardine oil were 66.5 and 66.6 cents per gallon on February 1 as compared with 60 cents on January 1 and 42 cents in February 1941.

British Columbia Canned Herring Pack Over 1,000,000 Cases

During December and January, fishing operations in British Columbia have been confined to herring, according to an American Consular report. The run on the west coast of Vancouver Island has so far proved disappointing. On January 31, the total catch amounted to 64,337 green tons, according to the Chief Supervisor of Fisheries. From this catch 5,007 tons of herring meal and 393,993 Imperial gallons of oil have been produced. The canned pack on that date was reported to be 1,081,027 cases.

Negotiations are now in progress with Japanese owners of approximately 1,000 fishing vessels with a view to arranging for the lease or sale of these boats to white operators.

THE CANNING OF ALEWIVES (RIVER HERRING), SEA HERRING, MACKEREL, AND FISH FLAKES

By
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In order to augment our food resources and supply our allies and ourselves with canned fishery products many of our lesser known species of fish as well as those canned infrequently or in small quantities are undergoing a close scrutiny to determine if new packs may not be developed and the smaller ones increased.

The Surplus Marketing Administration is interested in good canned fishery products which may be procured at fair prices for Lend-Lease transactions. It has purchased large supplies of salmon, and California and Maine sardines. It also has evinced interest in canned alewives or river herring, mackerel, fish flakes, and sea herring since all of these products could be packed in larger quantities in additional areas and all are excellent protein foods reasonable in cost.

To aid prospective packers of these or similar products the processes commonly used are described as they appear in the author's manuscript "Principles and Methods in the Canning of Fishery Products".

Alewives (River Herring)

Alewives or river herring (Pomolobus pseudoharengus) were first canned commercially as a part of the food conservation program during the World War, though river herring roe was canned many years previous to 1917. Most of the canning is done in the Chesapeake Bay area.

Alewives used in canning are caught by trap nets and are usually landed within 3 or 4 hours from the time of catch. They are hoisted out of the boat in metal buckets holding approximately 500 fish into a scaling and washing machine which consists of an inclined, revolving, wire mesh drum with a perforated pipe running along the axis. As the fish are carried through the drum the scales are removed by the tumbling action. Sprays of water from the perforated pipe wash the fish at the same time.

From the scaler and washer they are carried by belt or chain conveyors to long tables or low platforms fitted with slots, through which waste can be dropped onto belt conveyors or into buckets or barrels. The fish trimmings are manufactured into meal and oil. Alewives are cleaned by hand, the cleaner first cutting through the black spot just below the gills, then down the side from the throat through the vent, so as to remove the thin belly flesh without cutting into the roe.

After rinsing the fish in fresh water they are then placed in a 100° salinometer brine, where they are left from 8 to 12 hours. The exact length of time depends on the size and condition of the fish and is determined by the appearance and texture. The fish must be removed before the skin starts to wrinkle and change color, or before the texture of the flesh becomes too firm.

As soon as the alewives have absorbed enough brine to give the desired texture and flavor, they are cut into container-length pieces and piled into small baskets which are taken to the filling table. Holding in baskets also allows surplus brine and moisture to drain away. The pieces are filled into the cans, head and tail ends alternating and empty spaces are filled with the short pieces of flesh removed in cutting the fish to fit containers. The cans are packed with fill-in weights of 14, 16, 17, and 19 oz. A No. 1 tall can with a fill of 16 oz. is the most popular container.

In some canneries the fish are trimmed to container-length size before brining. Only the extreme tail end is trimmed off and no short pieces are used as fillers. The container used is taller and of greater diameter than the No. 1 tall can, and is known as a 307 cylinder, (307 x 604) or No. 2 tall can. Net contents of this can average 1 lb. 9 oz. Alewives packed in containers of this size, are wrapped separately in vegetable parchment paper before filling into the can.

The cans travel from the filling table to the exhaust box, passing under a perforated pipe, from which they are filled with hot brine, usually testing 20° salinometer; or sometimes hot water alone is used. The cans are exhausted by steam at a temperature of about 210° F., and for a period averaging about 3 minutes. This exhaust is insufficient. Cans examined rarely show more than 2 in. vacuum and often none at all. Exhaust should be increased to 8 minutes or the cans sealed with vacuum closing machines. The exhausted cans are sealed by a standard type closing machine and loaded into metal retort baskets, which when filled are hoisted into vertical retorts.

Processes differ according to the preference of the individual packer. Representative processes are: for No. 1 tall cans 50 minutes at 244° F. (12 lb. pressure) and for No. 2 tall cans 60 minutes at 250° F. (15 lb. pressure). While labeled "fresh river herring", this product most closely resembles and is used in place of "corned" or lightly salted alewives.

Eastern or "Boston" Mackerel

The canning season is approximately from July 15 to November 1. The mackerel used in canning are caught by purse seine. They are iced down in the hold of the fishing vessel as soon as caught and are usually from 24 to 36 hours out of water when landed at the cannery.

The mackerel are hoisted out of the hold in large tubs holding about 500 lb. each, and are piled near the cannery door. A workman lays the fish in slots on a conveyor which carries them past automatic knives set to cut the mackerel into can-length pieces (4-1/4 inches). The cut fish pass to dressing tables where the belly is split open and all offal, including the kidney, the dark streak along the backbone, is removed by hand.

The fish are washed thoroughly in 2 or 3 successive waters, each time for about 15 minutes, and are then put into wicker baskets to drain from 1/2 to 2 hours. The baskets are carried to filling tables where the mackerel are filled into cans which are usually inside lined with "C" enamel, seafood formula. Heads and tails are alternated in filling and no small pieces are used to fill up the can. Some packers use no spices or condiments but others may add a bay leaf to each can. No. 1 tall cans are filled to a declared net weight of 14 oz., while the stated net weight of No. 2 short cans is 16 oz. The cans are exhausted for 10 minutes at 200 to 212° F., sealed by an automatic can sealer and processed for 75 minutes at 240° F. The pack is water-cooled immediately after processing.

Some Atlantic Coast mackerel are canned as "fillets of salt mackerel". In preparing this pack the fish are headed and cleaned by hand, taking care to remove viscera, congealed blood and other offal as completely as possible. The cleaned fish are placed in wooden tanks, half filled with brine testing 90 to 100° salinometer, where they are left for about 12 hours, the exact length of time depending on the size and fatness of the fish and on the judgment of the packer. When brined sufficiently, the fish are filleted and the fillets are filled into oval cans of the type used for California sardines, which are lined with "C" enamel, seafood formula.

Two fillets are placed on the bottom of the can, then a piece of vegetable parchment paper is laid in, and 2 more fillets are placed on top. The cans pass along a conveyor under a perforated pipe which fills each can with hot brine. This brine is made in the proportions of 20 lb. of salt to 100 gal. of water, to which is added one quart of white distilled vinegar of 6 percent acidity. The cans are sealed in a double seamer without heat exhaust or the use of mechanical apparatus to secure a vacuum and are processed for 75 minutes at 240° F. The pack is water-cooled immediately after processing.

The cans are not labeled but are packed in individual lithographed pasteboard cartons. Fiberboard cartons holding 1 or 2 dozen cans are used as shipping containers. The cans are filled to a declared net weight of 12 oz. but usually contain somewhat more than this amount. The total loss in weight is estimated at 50 percent.

Pacific Mackerel

The mackerel should be handled as rapidly as possible. Regulations of the Board of Health, State of California, require that fish canned from any individual load shall be prepared and canned within 12 hours of arrival of the boat making the delivery. If the mackerel cannot be canned almost immediately on arrival, they should be covered with finely crushed ice, using at least 50 lb. of ice per 100 lb. of fish, or they should be stored in refrigerated brine at a temperature about 32° F. Mackerel boats fish at night as much as

possible, delivering to the cannery in the morning, so the fish need not be held long before canning.

Cleaning or Butchering.--Apparatus for butchering the mackerel and cutting them into container-length pieces is being developed to efficient performance and is apparently displacing hand butchering. If the fish are dressed by hand, the head is cut off just back of the gills; the worker then turns the fish quickly, almost simultaneously slashing the ventral surface of the body to the vent, scraping out the viscera. The heads and other offal are tossed into a flume by which they are carried to the reduction plant, while the butchered fish fall into a box with a capacity of about 20 lbs. The workers are paid according to the amount of fish cleaned.

The mackerel are carried by flume to cleaning tables where other workers scrape out the primordial kidney, the long black "blood streak" along the backbone, trim out any remaining bits of intestine or membranes and complete the washing action of the flume by brushing the fish. Workers then cut the mackerel into container-length pieces, using a mitre box to gauge the proper length of cut. The cut fish are dropped on a belt conveyor by which they are carried to the packing table or they may be emptied into a brine tank.

Machines used are of the same general type as equipment for mechanical dressing of sardines. The fish are placed in deep slots in individual blocks which are the upper part of a chain conveyor and pass under revolving circular knives, so spaced that the head and tail are severed and the body is cut into 2 container-length pieces. Another knife slits the body lengthwise and the fish are cleaned under a rotating brush. A final cleaning is given by hand under running water to remove the last traces of blood. Hand butchering is preferred as doing a better job of cleaning, and resulting in less waste of raw material. With large fish it is possible to get 3 pieces of fish by hand butchering. It is claimed that a crew of 14 can handle from 1 to 1-1/2 tons per hour by hand.1/

Brining.--The general practice has been to hold the mackerel after dressing and washing for 60 minutes in a brine testing 80 to 90° salinometer. The object of brining the mackerel is to improve the color of the canned product by soaking diffused blood out of the flesh, making the texture firmer and to give the necessary salt flavor to the finished article. Brining is now eliminated by some packers, who fill the mackerel into the cans immediately after cutting, mechanically adding from 3/16 to 1/4 oz. of salt to each can as it comes down the conveyor from the can loft. This is done to save time and reduce the cost of packing, but is undesirable since the texture is usually softer and the flesh darker. Canning technologists recommend that some system of brining be employed.

Filling.--The brined fish are carried by conveyor to a packing table where the containers are filled by hand, with women and girls doing the work. Beside or in front of each is a case of empty cans. The cans are removed from the case and filled with fish as rapidly as possible. As each case is used, it is replaced by a checker, who punches a piece-work card hanging by each worker.

Mackerel are packed in 4 container sizes. Containers are filled with raw fish to a level slightly above the rim of the can as there is considerable shrinkage in cooking. Head and tail ends of pieces of fish are alternated in filling the cans. A 1 lb. tall can will usually take 2 body sections of mackerel, one whole, the other split, so that a solid cylinder is obtained, or 1 large piece and 2 or 3 small pieces. The fill-in weights of raw fish are:

Table 16

Can, Trade Name	Can Makers Designation	Fill in weight in oz.
No. 1 Tall	301 X 411	17 5/8 to 17 3/4
No. 1 Meat	301 X 407	17 to 17 1/2
No. 1 Standard	211 X 400	11 1/2
8 oz.	211 X 304	9 1/8

The filled cans are placed on a belt conveyor running along the packing table. An inspector stands at the end of the table, culling out protruding bones, adding sufficient

1/ Continental Can Co. The canning of mackerel, Bull, Research Department, Continental Can Company, Inc., 8 pp. New York.

fish to slack filled cans to bring them to weight and removing the excess from overfilled cans. If the filling shows any amount of careless workmanship in filling, the forewoman checks the packers to determine responsibility.

Precooking or exhausting and sealing.--The mackerel are cooked in the open cans until the excess moisture is extracted. As the cans are still warm when sealed, a vacuum is obtained, which is incidental to precooking since the time is much longer than necessary to exhaust the containers. There is no standard length of precook as it varies according to the size of container and the preference of the individual packer. In most canneries the precooking is done in exhaust boxes of the same type as formerly used in salmon canneries but of larger size.

Other canneries, especially those where mackerel is not a major pack, precook in processing retorts or tuna cookers; the cans being stacked in retort baskets which are trucked to the retort. This practice requires more handling of the product and a greater amount of labor. If exhaust boxes are used, the cans are given a precook of from 20 to 45 minutes at 210 to 212° F. Cans in retorts or cookers are usually heated for a period of approximately 20 minutes at 216° F.

When the cans leave the exhaust box a perforated pipe above the conveyor fills each container with 3 percent salt brine. Some packers do not use brine, especially if the cans have been salted. The addition of brine should not be necessary if the fish have been brined before precooking and the containers are properly filled.

The cans next pass to the closing machines. These are usually set up with an attachment of plungers the diameter of the container. The plungers are adjusted to push the fish down into the cans, packing the fish into a solid cylinder and forcing out excess moisture. A runway carries the sealed cans to a washing machine.

The cans roll down a runway from the washing machine into large metal retort baskets, moving on low trucks. An apron of wire mesh is hung below the end of the runway to break the fall of the cans, thus preventing heavy dents but it is not entirely effective.

Processing and Cooling.--The time required to fill one of the large horizontal retorts is about 75 minutes, but there is some variation depending on the size of the retort and the rate of speed at which the closing machines are operating. The temperature in the center of the first cans placed in the retort should be approximately 130° F. when processing begins. Processes worked out for canned mackerel are based on this initial temperature. Excessive delay in filling the retort or in starting processing may, therefore, affect the sufficiency of the process. Control of processing by the Bureau of Cannery Inspection, California State Board of Health, guards against such delays. No. 1 Tall or No. 1 Meat cans must be processed 90 minutes at 240° F. (10 lb. pressure) or 75 minutes at 250° F. (15 lb. pressure). No. 1 Standard or 8 oz. Eastern oyster cans are processed 75 minutes at 240° F. or 60 minutes at 250° F.

The cans are usually water-cooled in the retort, by a spray cooling system, to a temperature of 100° F. The cans are machine labeled and cased after the inspector has marked the batch as released on the production records. The standard case of mackerel contains 48 No. 1 tall cans.

Fish Flakes

Fish flakes may be prepared from haddock or cod, or a mixture of the flesh of both species, but haddock is probably most often used. This pack is usually prepared in the period after Lent, when large catches are being landed and the market for fresh fish is not so active as at other seasons, making a supply of raw material available for canning. The fish are caught and brought in by trawlers and are of the same quality as those used in the preparation of fresh fillets.

The first step in canning is to wash the whole fish thoroughly, removing all traces of blood, viscera and other offal. When washed and cleaned, the fish are placed in a tank and brined for an average of 10 to 14 hours in a brine 100° salinometer. The length of brining period may vary according to the size of the fish, the total amount to be brined in an individual tank and the strength of the brine. It may be as much as 36 hours.

After brining, the fish are placed in large shallow aluminum pans, which are stacked in horizontal retorts and steamed for about 1 hour at 250° F. (15 lb. pressure). The object is to improve the texture by reducing the moisture content, and to separate the flakes readily from the skin and bones.

Some packers use fillets of haddock, canning that portion of their fillet production which the fresh fish market will not absorb except at prices showing a loss to the packer. Fillets are brined from 1 to 3 hours in a 70° salinometer brine, and steamed for 30 minutes at 250° F. (15 lb. pressure). The steamed fish are picked free of skin and bones, and are placed on a circular revolving filling table. As the cans pass under circular openings around the circumference, packers direct a sufficient amount of fish from the heap in the center of the table into the cans to obtain the required fill.

In other instances, especially where fillets are used, the flakes are packed at hand filling tables of the usual type. The hot flakes are turned out of the steaming pan into smaller trays placed by each packer. As the empty cans pass down the conveyor belt on the filling table, they are filled with hot fish scooped up in large spoons from the trays. The filler table conveyor takes the filled cans directly to the double seamer. Since the temperature of the contents averages about 165°F. at sealing, other means of obtaining a vacuum are not necessary. Two sizes of cans are used, 1/2 and 1 lb. flat and both are inside lined with "C" enamel, seafood formula.

The 1/2 lb. cans are processed for 60 minutes at 240° F. (10 lb. pressure) to 245° F. (12 lb. pressure), while 1 lb. cans are given a cook of 90 minutes at the same temperatures and pressures. The pack is water-cooled and when dry is labeled and packed in fiber-board shipping containers, usually 2 doz. cans to the case.

Sea Herring

Large sea herring may be packed by adapting any one of several processes used for similar fish to available equipment, can sizes and added ingredients. If the method used in packing alewives is chosen it would be necessary to experiment with the brining period since the time given for alewives probably would produce canned herring which were too salty.

The raw vacuum pack for California sardines might also be adapted. It involves preliminary brining and drying of the sardines which have been beheaded, eviscerated and cut to container-length pieces mechanically.

Brining.--The cleaned and eviscerated fish are flumed to the brining tanks. After being filled with fish, the flume water is drained and a dense salt solution of 80 to 100° salinometer is added. Brining requires from 60 to 90 minutes. Mechanical agitation or intermittent stirring by an attendant is necessary during this time if the salting is to be uniform. Brining makes the texture more firm, extracts the blood, removes slime which adheres to the fish even after washing and provides a means of temporary storage, so that the sardines may be held in good condition.

Drying.--The purpose of drying is to extract sufficient surface moisture so that during later processing the skin will not become ruptured and peel. The brined fish are flumed to a wire mesh conveyor leading to a tunnel-shaped tumbler dryer. These dryers are usually 50 to 75 feet long, 7 to 9 feet wide and 10 to 14 feet high, containing 6 to 8 endless wire mesh belt conveyors, with alternate runs, staggered and traveling opposite directions. The sardines are conveyed to the top run and after traveling the length of the dryer they drop 6 to 8 inches directly below to the staggered conveyor which is moving in the opposite direction. This process is repeated until the sardines are discharged to a conveyor which transports them to the fry vats or to the next step in the canning operation.

A current of warm dry air is blown through the dryer taking up moisture. The moisture-laden air escapes through air ducts or the open end of the dryer. The time of drying varies with dryer construction, velocity and temperature of the air and condition of the fish, with the latter factor prehaps the most important. When sardines are properly dried, the loss in weight is from 4 to 6 percent at a drying time varying from 60 to 90 minutes at 90 to 100° F.

Pack.--Approximately 1 oz. of tomato or mustard sauce is added to each empty 1 lb. oval can. The cans are conveyed to the packing tables where they are filled with 15 oz. of brined

and dried raw fish. An additional ounce of sauce is added as the packed cans pass to the vacuum sealing machines. The covers are loosely clinched and the cans conveyed through the rotary valve into the vacuum sealing chamber where a vacuum ranging from 18 to 22 inches is drawn during the sealing operation. An internal vacuum from 3 to 5 inches is thus secured in the filled cans. The packing procedure is simple, efficient and the cost is low. One disadvantage may be cited, namely, a tendency toward loose and slack filled containers, which is increased if the product must be handled considerably or shipped long distances.

The brine pack of California sardines also offers possibilities. This pack consists of fish which have been cleaned and packed into cans, followed by a long exhaust or precook, with a hot brine added just prior to closure. Other pre-treatment may include smoking but in any method of preparation the fish are seldom thoroughly cooked before brining and closing. Two sizes of cylindrical cans are used, the 6 oz. paste (202 x 309) and the No. 1 tall (301 x 411). The 6 oz. paste can is packed with smaller cuts of fish to a fill weight of 5 oz. The No. 1 tall can is better adapted to the larger sizes but may be and is used for the smaller cuts as well. The fill weight in this can is 17 oz. of cleaned raw fish. The exhaust time for the 6 oz. can is approximately 5 minutes while for the No. 1 tall, 20 to 35 minutes at 210° F. is necessary to produce the desired shrinkage. A circular plunger attached directly to the closing machine, and slightly smaller in diameter than the can, depresses the can contents to secure the necessary head-space. A hot 4 percent salt solution is then added and the cans are sealed.

Processing times required by the California Bureau of Cannery Inspection are as follows:

Type pack	Can size	Initial temperature (degrees F.)	Process time in minutes at 230° F.	240° F.	250° F.
Brine	No. 1 tall	70	125	90	75
"	" "	130	110	80	65
"	" "	150	100	75	60
Tomato or mustard sauce	1 lb. oval	70	130	75	55
"	" "	130	120	70	50
"	" "	150	115	65	50

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OUTPUT OF CAÇÃO-LIVER OIL MAY BE INCREASED IN BRAZIL

Oil from the liver of the Caçao (a fish common to the coast of the State of Sao Paulo) has been exploited for the past 3 years in the Municipio of Ubatuba, where it is used as a substitute for cod-liver oil in the preparation of concentrated fattening foods for animals, according to Foreign Commerce Weekly. Other uses for caçao-liver oil, as reported by the Sao Paulo State Department of Agriculture, include soap and candle manufacture, tanning, and recently, in combination with margarine, it has been used in metallurgy and as a lubricating oil.

During the past 3 years the production of caçao oil has amounted to 400 boxes of 36 liters each, packed in cans. It is believed, however, that this output can be increased considerably and that an important supply of caçao livers can be secured from the fishermen of Santos, provided there is sufficient demand. In fact, special interest has been shown in improving the production and in instituting exportation of this oil.

Up to the close of 1941, the common price of the poorly prepared product has been only 3$000 (15 cents United States currency) per kilogram. No caçao oil has as yet been exported from Santos.

THE COVER PAGE

The trim vessel on the cover page is a menhaden purse seiner lying at the Fulton Market dock in New York City with Brooklyn Bridge in the immediate background. The two seine boats carried are moored near the bow. The purse seiner was visiting New York, not delivering fish, since menhaden are not marketed as fresh food fish, but are utilized in the manufacture of fish meal and fish oil.

FISHERY TRADE INDICATORS

(Expressed in Thousands of Pounds)

Item	Month	Latest month	Same month a year ago	Previous month
FRESH FISH LANDINGS				
Boston, Mass.	December	19,346	20,751	23,067
Gloucester, Mass.	do	7,903	8,440	12,336
Portland, Maine	do	948	1,124	1,642
Boston, Gloucester, and Portland:				
Cod	do	3,888	5,096	7,461
Haddock	do	7,425	6,245	6,879
Pollock	do	7,999	7,928	10,036
Rosefish	do	6,409	7,351	8,804
FISH RECEIPTS, CHICAGO 1/				
Salt-water fish	do	1,972	1,388	2,135
Fresh-water fish	do	2,706	3,003	2,683
Shellfish, etc.	do	1,409	1,523	1,431
By truck	do	2,408	2,500	2,181
By express	do	829	846	1,102
By freight	do	2,850	2,567	2,966
COLD STORAGE HOLDINGS 2/				
New York, N. Y.:				
Salt-water fish	January	6,059	4,365	7,067
Fresh-water fish	do	1,511	2,702	1,605
Shellfish, etc.	do	2,268	1,677	2,606
Boston, Mass.:				
Salt-water fish	do	9,901	12,100	14,417
Fresh-water fish	do	28	55	31
Shellfish, etc.	do	1,265	895	1,329
Chicago, Ill.:				
Salt-water fish	do	3,015	1,590	2,770
Fresh-water fish	do	3,018	2,336	3,032
Shellfish, etc.	do	1,582	1,118	1,731
Unclassified	do	270	306	268
United States:				
Cod fillets	do	2,409	2,621	3,242
Haddock fillets	do	7,262	5,066	9,017
Halibut	do	8,829	7,607	11,164
Mackerel	do	5,951	6,132	7,543
Pollock fillets	do	4,079	6,128	5,147
Rosefish fillets	do	3,214	1,460	4,613
Salmon	do	9,318	9,115	11,506
Whiting	do	7,849	8,663	10,478
Shrimp	do	8,775	5,808	9,569
New England, all species	do	21,859	25,624	30,423
Middle Atlantic, all species	do	21,471	15,531	23,289
South Atlantic, all species	do	5,857	4,178	7,110
North Central East, all species	do	19,069	15,477	19,789
North Central West, all species	do	5,664	4,358	6,599
South Central, all species	do	6,163	3,760	7,133
Pacific, all species	do	17,162	17,690	22,930

1/ Includes all arrivals as reported by express and rail terminals, and truck receipts as reported by wholesale dealers including smokers.

2/ Data for individual cities are as of the last Thursday of the month, except those for Boston which are for the last Wednesday of the month, and those for geographical areas and the total of the United States which are as of the 15th of the month.

Note.--Data for the latest month are subject to revision.

PRINCIPAL FISHERY FIELD OFFICES AND LABORATORIES
OF THE FISH AND WILDLIFE SERVICE

Division of Fishery Industries

Boston, Mass.	B. E. Lindgren.....	253½ Northern Ave. Market News Service.
Chicago, Ill.	E. C. Hinsdale.....	200 N. Jefferson St. Market News Service
Cincinnati, Ohio....	C. H. Chilton.....	Palace Hotel. Market Development.....
College Park, Md. ..	J. M. Lemon.....	Fisheries Technological Laboratory.....
	K. O. Burr.....	P. O. Box 128. Market Development.....
Des Moines, Iowa....	J. J. Murray.....	General Delivery. Market Development..
Jacksonville, Fla. .	S. C. Denham.....	309 Duval Bldg. Market News Service...
Ketchikan, Alaska...	M. E. Stansby.....	Fisheries Technological Laboratory.....
Mayaguez, P. R.	J. F. Puncochar.....	Fisheries Technological Laboratory.....
New Orleans, La. ...	C. E. Peterson.....	1100 Decatur St. Market News Service..
New York, N. Y.	W. H. Dumont.....	155 John St. Market News Service.....
Pittsburgh, Pa.	F. C. Randlett.....	438-J New P.O. Bldg. Market Development.
San Pedro, Calif. ..	C. B. Tendick.....	Post Office Bldg. Fishery Statistics..
Seattle, Wash.	R. W. Harrison.....	2725 Montlake Blvd. Fisheries Technological Laboratory.....
	V. J. Samson.....	417 Bell St. Terminal. Market News Service.....

Division of Fish Culture

		Regional Headquarters:
Albuquerque, N. Mex.	Theodore S. Kibbe.....	220 West Copper Ave. Reg. #2.....
Atlanta, Ga.	John Blosz.....	316 Glenn Bldg. Reg. #4.....
Boston, Mass.	Henry C. Markus.....	1140 Park Square Bldg. Reg. #5.....
Minneapolis, Minn. .	C. F. Culler.....	500 National Building. Reg. #3.....
Portland, Oreg.	Alphonse Kemmerich.....	600 Weatherly Building. Reg. #1.....

Division of Fishery Biology

Ann Arbor, Mich. ...	Dr. John Van Oosten.....	University Museums. Great Lakes Fisheries Investigations.....
Beaufort, N. C.	Dr. Herbert F. Prytherch.	Fisheries Biological Laboratory.....
Cambridge, Mass. ...	W. C. Herrington.....	Room A-210 Harvard Biological Laboratory N. Atlantic Fisheries Investigations.
College Park, Md. ..	Robert A. Nesbit.....	Fishery Technological Laboratory Mid. & S. Atlantic Fish. Investigations
Columbia, Mo.....	Dr. M. M. Ellis.....	101 Willis Ave. Interior Waters Investigations.....
Milford, Conn.	Dr. Victor Loosanoff.....	Fishery Laboratory. New England Oyster Investigations.....
New Orleans, La. ...	M. J. Lindner.....	302 Custom House Bldg. 423 Canal St. Gulf Shrimp Investigations.....
Pensacola, Fla.	Dr. A. E. Hopkins.....	Box 1826. Gulf Oyster Investigations..
Seattle, Wash.	George B. Kelez.....	Alaska Fishery Investigations 2725 Montlake Blvd. .....
	Harlan B. Holmes.....	North Pacific Fisheries Investigations 2725 Montlake Blvd. .....
Stanford University, Calif.	O. E. Sette.....	Room 450-B Jordan Hall. Pilchard Investigations.....

Division of Alaska Fisheries

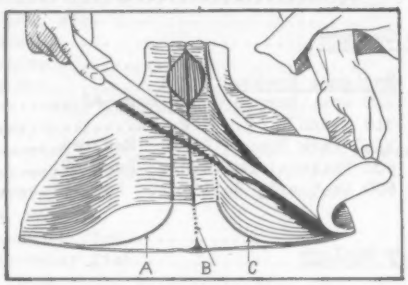
Juneau, Alaska.....	Paul Thompson.....	Federal Bldg. Alaska Fisheries Service
Seattle, Wash.	Clarence L. Olson.....	706 Federal Bldg. Alaska Fisheries
	(Miss) Ted Murphy.....	Service.....

MARKETING OF SHAD ON THE ATLANTIC COAST

INVESTIGATIONAL REPORT NO. 38

The season for shad has already started in the South Atlantic States. They will be at their peak of abundance in more northern States shortly. Consequently, the Fish & Wildlife Ser.calls to your attention the publication entitled "Marketing of Shad on the Atlantic Coast", by Fred F. Johnson of theService's staff.

The report includes the findings of a consumer survey covering eight cities from Washington, D. C., to Charleston, S. C. This survey dealt not only with shad but fish in general and brought out the following facts, among others, concerning dietary habits of the families surveyed:



Boning shad operation No. 1

1. The average family serves an average of 51 seafood meals at home annually.

2. The average family eats 6 seafood meals at public eating houses each year.

3. The average 2-person family purchases 1.7 pounds of dressed seafood per meal; a 3-person family, 2.2 pounds; a 4-person family, 2.4 pounds; and a 5-person family, 2.8 pounds.

4. Nearly 50 percent of the 2-person families surveyed in Washington, D. C., and Richmond and Newport News, Va., purchase one pound of dressed seafood or less per meal.

5. Nearly 38 percent of the 3-person families surveyed in the same cities purchase one and one-half pounds of dressed seafood or less per meal.


Boning shad operation No. 2

The small size of the average purchases of fish by small families is most significant in view of the fact that 44 percent of this country's families consist of those of two and three persons.

In addition to discussions of the shad fishery and trade in shad products, the report includes tested recipes for preparing shad and shad roe, and describes a method for boning shad, two illustrations of which appear above.

This report may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents, by requesting Fisheries Investigational Report No. 38.

SOURCES OF FEDERAL FISHERY STATISTICS

Fish and Wildlife Service Reports

Current Fishery Statistics:

Landings at Important Fishing Ports.--Monthly and annual detailed data: Landings at Boston and Gloucester, Mass., and Portland, Maine, by poundage and value, and catch by species, gear and bank; and receipts and landings at Seattle, Wash., and operations of Pacific Halibut Fleet.

Freezings and Cold-storage Holdings of Fishery Products.--Monthly and annual data on fishery products frozen and held.

Production of Manufactured Fishery Products.--Annual information on production of canned fishery products and byproducts; production of fresh and frozen packaged fish; summary of quantity and value of all manufactured fishery products; and preliminary statements on canned salmon and oyster packs and production of fresh-water mussel-shell products.

Sectional Surveys.--Annual information on number of commercial fishermen; kind and quantity of fishing gear operated; poundage and value of catch; employment in fishery wholesale and manufacturing establishments; and data on the production of manufactured fishery products for: New England, Middle Atlantic, Chesapeake Bay, South Atlantic and Gulf, Pacific Coast and Lake States, and Alaska.

Fishery Market News:

Market News Reports.--Daily, monthly and annual mimeographed reports on production, movement, prices, storage and canning of fishery products from 6 field offices.

Market News Review.--"Fishery Market News", a periodic current review of fishery marketing information.

Annual Report:

Fishery Industries of the United States.--Review of activities of Division of Fishery Industries and summarization of Current Fishery Statistics, usually in greater detail.

Bureau of Foreign and Domestic Commerce Reports

Imports of Fish and Fish Products.--Monthly advance statement on poundage and value of imported edible fishery products by country of origin.

Exports of Meat and Canned Fish.--Monthly advance statement on exports of canned salmon, sardines, shrimp, and other shellfish, to individual foreign countries.

Monthly Summary of Foreign Commerce of the United States.--Report on total poundage and value of fishery products imported and exported.

Foreign Commerce and Navigation of the United States.--Annual report on imports and exports with principal items shown separately.

Bureau of the Census Reports

Production, Consumption, and Stocks of Fats and Oils.--Quarterly statement on domestic production, imports, exports, and stocks of cod and cod-liver oil, whale oil, and other fish oils.

Factory Consumption of Primary Animal and Vegetable Fats and Oils, by Classes of Products.--Advance annual report on poundage of marine-animal (whale oil) and fish oil utilized in manufacture of various edible and industrial products.

Animal and Vegetable Fats and Oils.--Annual summary combining two reports above, plus comparative figures for preceding years.

Quarterly Canned Foods Stock Report.--Information on canners and distributors stocks of canned salmon, sardines, and tuna.

Bureau of Labor Statistics Reports

Wholesale Prices.--June and December issues contain average monthly wholesale prices of canned pink and red salmon, pickled cod and herring, salt mackerel, and smoked salmon for each of the preceding six months.

Retail Prices.--Monthly report containing retail prices of pink and red salmon.

Tariff Commission Reports

Periodic Reports.--Include studies on specific fisheries or fishery problems.

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FRESH AND FROZEN FISHERY PRODUCTS REFERENCE MANUAL

FISHERY MARKET NEWS — AUGUST 1941 SUPPLEMENT

A reference manual containing a large volume of data concerning fresh and frozen fish and shellfish was issued as a supplement to the August 1941 issue of Fishery Market News. It was prepared primarily for use by Army purchasing officers and mess sergeants to aid them in procuring supplies of fishery products for our armed forces.

The manual contains detailed information on the following:

1. Food value, edible portion, fat content, and fuel value of fishery products.
2. Where to obtain fishery marketing information.
3. The usual market forms of fishery products.
4. The seasons for fresh fishery products in a number of producing areas and markets.
5. Standards.
6. Shipping containers.
7. Suggestions for purchasing and preparing fish and shellfish.
8. Methods of cooking.
9. Basic recipes.

Copies of the issue containing the manual may be obtained without charge upon request from the Fish and Wildlife Service, Washington, D. C.